BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 02/28/2022

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. ARP	66.034	$	$	$ 499,100.00	$	$ 499,100.00
2.						
3.						
4.						
5. Totals		$	$	$ 499,100.00	$	$ 499,100.00

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Prescribed by OMB (Circular A -102) Page 1

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1) ARP	(2)	(3)	(4)	Total (5)
a. Personnel	$	$	$	$	$
b. Fringe Benefits					
c. Travel					
d. Equipment	168,800.00				168,800.00
e. Supplies	21,900.00				21,900.00
f. Contractual	189,600.00				189,600.00
g. Construction					
h. Other	118,800.00				118,800.00
i. Total Direct Charges (sum of 6a-6h)	499,100.00				$ 499,100.00
j. Indirect Charges					$
k. TOTALS (sum of 6i and 6j)	$ 499,100.00	$	$	$	$ 499,100.00
7. Program Income	$	$	$	$	$

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SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8. ARP	$	$	$	$
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	$	$	$	$

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 166,366.68	$ 41,591.67	$ 41,591.67	$ 41,591.67	$ 41,591.67
14. Non-Federal	$				
15. TOTAL (sum of lines 13 and 14)	$ 166,366.68	$ 41,591.67	$ 41,591.67	$ 41,591.67	$ 41,591.67

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS) (b)First	(c) Second	(d) Third	(e) Fourth
16. ARP	$ 166,366.68	$ 166,366.66	$ 166,366.66	$
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	$ 166,366.68	$ 166,366.66	$ 166,366.66	$

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges:

22. Indirect Charges:

23. Remarks:

Project Narrative File(s)

*** Mandatory Project Narrative File Filename:** 1234-2022-03-22 RFP Workplan Final.pdf

Add Mandatory Project Narrative File | Delete Mandatory Project Narrative File | View Mandatory Project Narrative File

To add more Project Narrative File attachments, please use the attachment buttons below.

Add Optional Project Narrative File | Delete Optional Project Narrative File | View Optional Project Narrative File

EPA KEY CONTACTS FORM

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Authorized Representative: *Original awards and amendments will be sent to this individual for review and acceptance, unless otherwise indicated.*

Name: Prefix: Mr. First Name: ANDREW Middle Name:
Last Name: ROBERTSON Suffix:
Title: FISCAL OFFICER

Complete Address:

Street1: 1001 I Street
Street2: 20th Floor
City: Sacramento State: CA: California
Zip / Postal Code: 95814 Country: USA: UNITED STATES
Phone Number: (916) 322-8211 **Fax Number:** (916) 322-9612
E-mail Address: Andrew.Robertson@arb.ca.gov

Payee: *Individual authorized to accept payments.*

Name: Prefix: Mr. First Name: EDDYBRETO Middle Name:
Last Name: AVILA Suffix:
Title: STAFF SERVICES MANAGER II

Complete Address:

Street1: 1001 I Street
Street2: 20th Floor
City: Sacramento State: CA: California
Zip / Postal Code: 95814 Country: USA: UNITED STATES
Phone Number: (916) 322-0558 **Fax Number:** (916) 322-9612
E-mail Address: Eddy.Avila@arb.ca.gov

Administrative Contact: *Individual from Sponsored Programs Office to contact concerning administrative matters (i.e., indirect cost rate computation, rebudgeting requests etc).*

Name: Prefix: Mr. First Name: ADAM Middle Name:
Last Name: YANG Suffix:
Title: STAFF SERVICES MANAGER I

Complete Address:

Street1: 1001 I Street
Street2: 20th Floor
City: Sacramento State: CA: California
Zip / Postal Code: 95814 Country: USA: UNITED STATES
Phone Number: (916) 327-8885 **Fax Number:** (916) 322-9612
E-mail Address: Adam.Yang@arb.ca.gov

EPA KEY CONTACTS FORM

Project Manager: *Individual responsible for the technical completion of the proposed work.*

Name: Prefix: Mr. First Name: Michael Middle Name:

Last Name: Miguel Suffix:

Title: Assistant Division Chief

Complete Address:

Street1: 1001 I Street

Street2: 20th Floor

City: Sacramento State: CA: California

Zip / Postal Code: 95814 Country: USA: UNITED STATES

Phone Number: (916) 322-0960 **Fax Number:**

E-mail Address: Michael.Miguel@arb.ca.gov

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Preaward Compliance Review Report for All Applicants and Recipients Requesting EPA Financial Assistance

Note: Read Instructions before completing form.

I. A. Applicant/Recipient (Name, Address, City, State, Zip Code)

Name: California Air Resources Board

Address: 1001 I Street
20th Floor

City: Sacramento

State: CA: California Zip Code: 95814

B. DUNS No. 195930276

II. Is the applicant currently receiving EPA Assistance? ☒ Yes ☐ No

III. List all civil rights lawsuits and administrative complaints pending against the applicant/recipient that allege discrimination based on race, color, national origin, sex, age, or disability. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

None to report

IV. List all civil rights lawsuits and administrative complaints decided against the applicant/recipient within the last year that allege discrimination based on race, color, national origin, sex, age, or disability and enclose a copy of all decisions. Please describe all corrective actions taken. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

None to report

V. List all civil rights compliance reviews of the applicant/recipient conducted by any agency within the last two years and enclose a copy of the review and any decisions, orders, or agreements based on the review. Please describe any corrective action taken. (40 C.F.R. § 7.80(c)(3))

None to report

VI. Is the applicant requesting EPA assistance for new construction? If no, proceed to VII; if yes, answer (a) and/or (b) below.

☐ Yes ☒ No

a. If the grant is for new construction, will all new facilities or alterations to existing facilities be designed and constructed to be readily accessible to and usable by persons with disabilities? If yes, proceed to VII; if no, proceed to VI(b).

☐ Yes ☐ No

b. If the grant is for new construction and the new facilities or alterations to existing facilities will not be readily accessible to and usable by persons with disabilities, explain how a regulatory exception (40 C.F.R. 7.70) applies.

VII. Does the applicant/recipient provide initial and continuing notice that it does not discriminate on the basis of race, color, national origin, sex, age, or disability in its program or activities? (40 C.F.R 5.140 and 7.95)	☒ Yes	☐ No
a. Do the methods of notice accommodate those with impaired vision or hearing?	☒ Yes	☐ No
b. Is the notice posted in a prominent place in the applicant's offices or facilities or, for education programs and activities, in appropriate periodicals and other written communications?	☒ Yes	☐ No
c. Does the notice identify a designated civil rights coordinator?	☒ Yes	☐ No
VIII. Does the applicant/recipient maintain demographic data on the race, color, national origin, sex, age, or handicap of the population it serves? (40 C.F.R. 7.85(a))	☒ Yes	☐ No
IX. Does the applicant/recipient have a policy/procedure for providing access to services for persons with limited English proficiency? (40 C.F.R. Part 7, E.O. 13166)	☒ Yes	☐ No

X. If the applicant is an education program or activity, or has 15 or more employees, has it designated an employee to coordinate its compliance with 40 C.F.R. Parts 5 and 7? Provide the name, title, position, mailing address, e-mail address, fax number, and telephone number of the designated coordinator.

Beverly Bueno, Equal Opportunity Officer
1001 I Street
P.O. Box 2815
Sacramento, CA 95812
Email: Beverly.Bueno@arb.ca.gov
Telephone: (916) 323-7053, Fax: (916) 445-6531

XI. If the applicant is an education program or activity, or has 15 or more employees, has it adopted grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 C.F.R. Parts 5 and 7? Provide a legal citation or Internet Address for, or a copy of, the procedures.

Yes - https://ww3.arb.ca.gov/eo/civil-rights-policy5-20-16.pdf
https://ww3.arb.ca.gov/eo/civil-rights-policy.htm

For the Applicant/Recipient

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law. I assure that I will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized Official	B. Title of Authorized Official	C. Date
Adam Yang	Fiscal Officer	03/25/2022

For the U.S. Environmental Protection Agency

I have reviewed the information provided by the applicant/recipient and hereby certify that the applicant/recipient has submitted all preaward compliance information required by 40 C.F.R. Parts 5 and 7; that based on the information submitted, this application satisfies the preaward provisions of 40 C.F.R. Parts 5 and 7; and that the applicant has given assurance that it will fully comply with all applicable civil rights statures and EPA regulations.

A. *Signature of Authorized EPA Official	B. Title of Authorized Official	C. Date

*** See Instructions**

Instructions for EPA FORM 4700-4 (Rev. 06/2014)

General. Recipients of Federal financial assistance from the U.S. Environmental Protection Agency must comply with the following statutes and regulations.
Title VI of the Civil Rights Acts of 1964 provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. The Act goes on to explain that the statute shall not be construed to authorize action with respect to any employment practice of any employer, employment agency, or labor organization (except where the primary objective of the Federal financial assistance is to provide employment). Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act provides that no person in the United States shall on the ground of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under the Federal Water Pollution Control Act, as amended. Employment discrimination on the basis of sex is prohibited in all such programs or activities. Section 504 of the Rehabilitation Act of 1973 provides that no otherwise qualified individual with a disability in the United States shall solely by reason of disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. Employment discrimination on the basis of disability is prohibited in all such programs or activities. The Age Discrimination Act of 1975 provides that no person on the basis of age shall be excluded from participation under any program or activity receiving Federal financial assistance. Employment discrimination is not covered. Age discrimination in employment is prohibited by the Age Discrimination in Employment Act administered by the Equal Employment Opportunity Commission. Title IX of the Education Amendments of 1972 provides that no person in the United States on the basis of sex shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance. Employment discrimination on the basis of sex is prohibited in all such education programs or activities. Note: an education program or activity is not limited to only those conducted by a formal institution. 40 C.F.R. Part 5 implements Title IX of the Education Amendments of 1972. 40 C.F.R. Part 7 implements Title VI of the Civil Rights Act of 1964, Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act, and Section 504 of The Rehabilitation Act of 1973. The Executive Order 13166 (E.O. 13166) entitled; "Improving Access to Services for Persons with Limited English Proficiency" requires Federal agencies work to ensure that recipients of Federal financial assistance provide meaningful access to their LEP applicants and beneficiaries.

Items "Applicant" means any entity that files an application or unsolicited proposal or otherwise requests EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Recipient" means any entity, other than applicant, which will actually receive EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Civil rights lawsuits and administrative complaints" means any lawsuit or administrative complaint alleging discrimination on the basis of race, color, national origin, sex, age, or disability pending or decided against the applicant and/or entity which actually benefits from the grant, but excluding employment complaints not covered by 40 C.F.R. Parts 5 and 7. For example, if a city is the named applicant but the grant will actually benefit the Department of Sewage, civil rights lawsuits involving both the city and the Department of Sewage should be listed. "Civil rights compliance review" means any review assessing the applicant's and/or recipient's compliance with laws prohibiting discrimination on the basis of race, color, national origin, sex, age, or disability. Submit this form with the original and required copies of applications, requests for extensions, requests for increase of funds, etc. Updates of information are all that are required after the initial application submission. If any item is not relevant to the project for which assistance is requested, write "NA" for "Not Applicable." In the event applicant is uncertain about how to answer any questions, EPA program officials should be contacted for clarification. * Note: Signature appears in the Approval Section of the EPA Comprehensive Administrative Review For Grants/Cooperative Agreements & Continuation/Supplemental Awards form.

Other Attachment File(s)

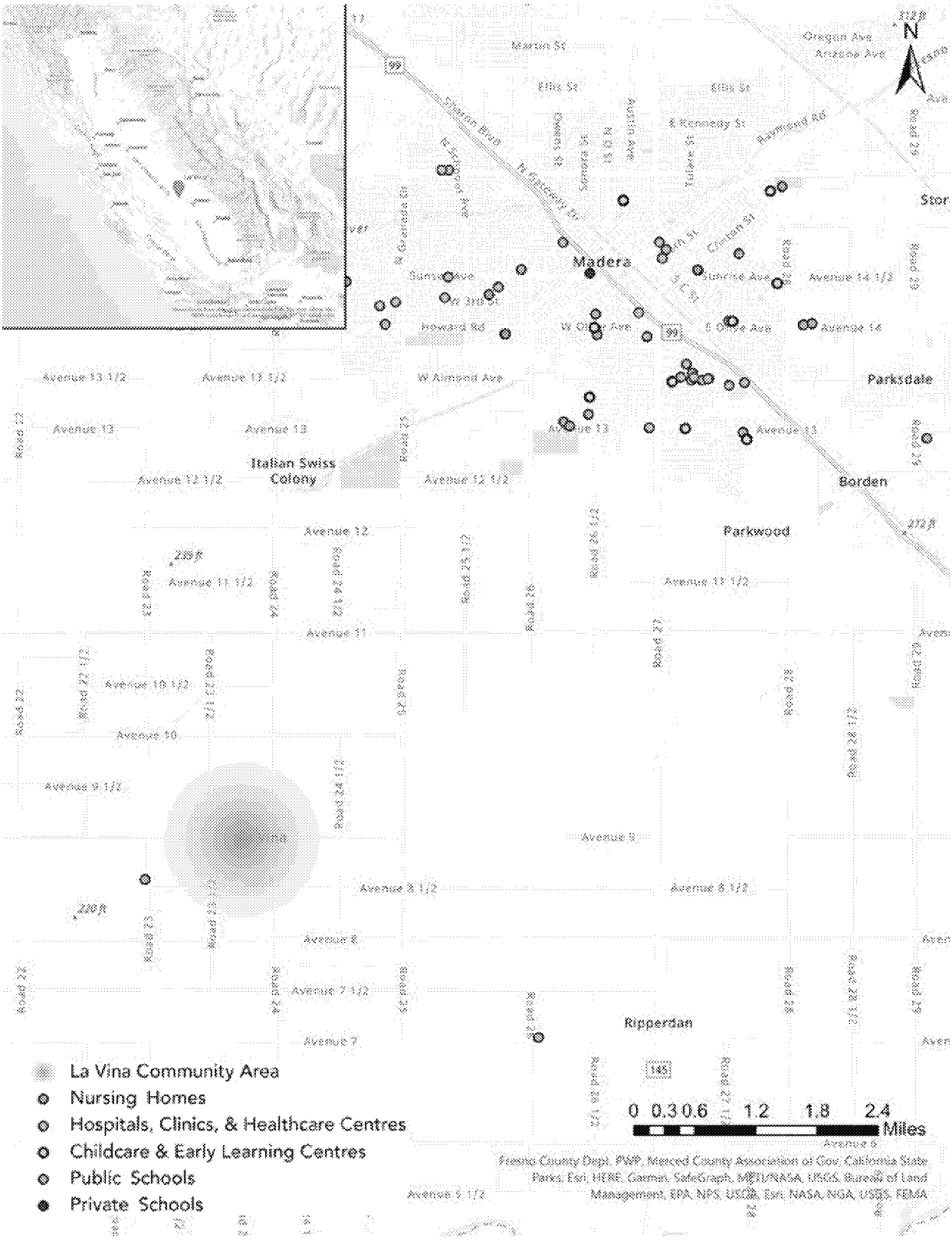
*** Mandatory Other Attachment Filename:** 1235-Quality Assurance Statement Final.pdf

Add Mandatory Other Attachment | Delete Mandatory Other Attachment | View Mandatory Other Attachment

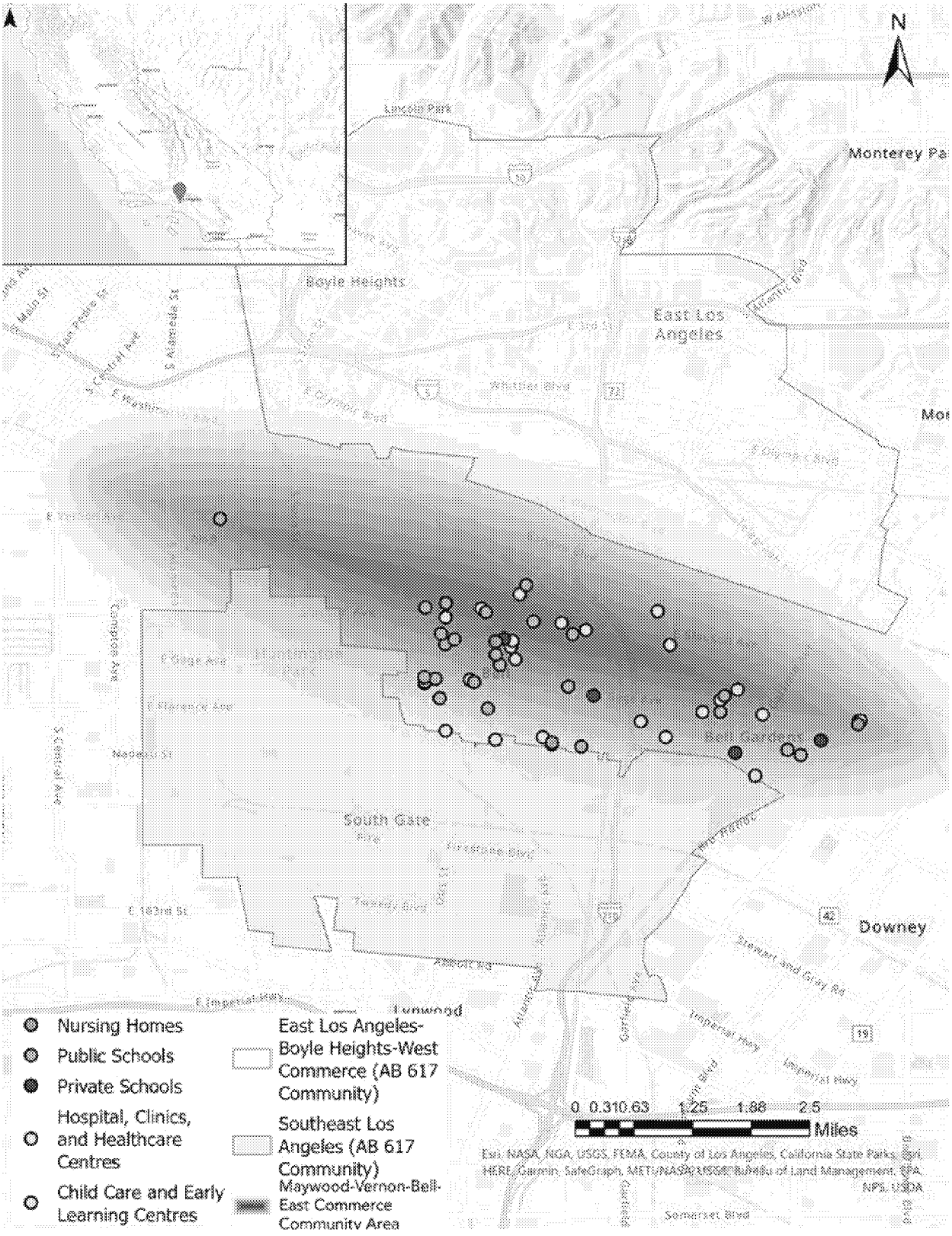
To add more "Other Attachment" attachments, please use the attachment buttons below.

Add Optional Other Attachment | Delete Optional Other Attachment | View Optional Other Attachment

La Vina Community Area with Surrounding Sensitive Receptors



Maywood-Vernon-Bell-East Commerce Community Area with Surrounding Sensitive Receptors and Existing AB 617 Communities



United States
ENVIRONMENTAL PROTECTION AGENCY
Washington, DC 20460

OMB Control No. 2030-0020
Approval expires 06/30/2024

66.034
EPA Project Control Number

CERTIFICATION REGARDING LOBBYING

CERTIFICATION FOR CONTRACTS, GRANTS, **LOANS AND COOPERATIVE AGREEMENTS**

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including sub-contracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31 U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Andrew Robertson / Fiscal Officer
Typed Name & Title of Authorized Representative

Andrew Robertson Digitally signed by Andrew Robertson
Date: 2022.03.22 15:44:47 -07'00'
Signature and Date of Authorized Representative

OMB Number: 4040-0004
Expiration Date: 12/31/2022

Application for Federal Assistance SF-424

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received: 03/25/2022

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: California Air Resources Board

* b. Employer/Taxpayer Identification Number (EIN/TIN): 68-0288069

* c. Organizational DUNS: 1959302760000

d. Address:

* Street1: 1001 I Street
Street2: P.O. Box 1436
* City: Sacramento
County/Parish:
* State: CA: California
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 95812-1436

e. Organizational Unit:

Department Name: California Air Resources Board

Division Name: Administrative Services Div.

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: Mr.
* First Name: EDDYBRETO
Middle Name:
* Last Name: AVILA
Suffix:

Title: STAFF SERVICES MANAGER II

Organizational Affiliation: California Air Resources Board

* Telephone Number: (916) 322-0558
Fax Number: (916) 322-9612

* Email: Eddy.Avila@arb.ca.gov

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

A: State Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.034

CFDA Title:

Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act

*** 12. Funding Opportunity Number:**

EPA-OAR-OAQPS-22-01

* Title:

Enhanced Air Quality Monitoring for Communities

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Community Air Monitoring in California with Promoted Community Engagement and Partnership to co-design and implement air quality monitoring in two distinct environmental justice (EJ) communities

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: ALL

* b. Program/Project: CA-ALL

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 11/01/2022

* b. End Date: 11/30/2025

18. Estimated Funding ($):

* a. Federal	499,100.00
* b. Applicant	0.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	499,100.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☒ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☐ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: Mr. * First Name: ANDREW

Middle Name:

* Last Name: ROBERTSON

Suffix:

* Title: Fiscal Officer

* Telephone Number: (916) 322-8211 Fax Number: (916) 322-9612

* Email: Andrew.Robertson@arb.ca.gov

* Signature of Authorized Representative: Adam Yang * Date Signed: 03/25/2022

Central California Environmental Justice Network

March 21, 2022

California Air Resources Board
1001 I Street, 6th Floor
Sacramento, California 95814

Dear Catherine Dunwoody,

I write on behalf of the Central California Environmental Justice Network (CCEJN) in support of the California Air Resources Board's proposal to the United States Environmental Protection Agency (USEPA) for a grant to fund the CARB Community Air Monitoring project to conduct ambient air monitoring of pollutants of greatest concern in two communities with environmental and health outcome disparities stemming from pollution. We strongly support this grant application and the focus on supporting community and local efforts to monitor their air quality and promote air quality monitoring partnerships between communities, state, and local governments.

Since 2000, CCEJN has promoted environmental justice and health equity in the San Joaquin Valley through a focus on advancing community resilience in disadvantaged communities and serving as a hub for environmental activism in Central Valley. CCEJN empowers grassroots leadership to educate and empower communities, especially rural and underserved communities in the San Joaquin Valley, by providing technical assistance and resources regarding public health.

CCEJN has played a leadership role in guiding the implementation of the state's AB 617 program in various communities in the Central Valley including Shafter, Fresno, and Arvin-Lamont. The AB617 program is designed to drive community-scale air quality protection. We are also represented on the AB 617 Consultation Group and on community steering committees in the San Joaquin Valley that are implementing strategies to improve air quality. We also support AB617 community air monitoring and are partnering closely with the statewide collaborative Allies in Reducing Emissions (AIRE) and the region-wide collaborative San Joaquin Valley Environmental Justice Collaborative (SJVEJC), which also includes the Central CA Asthma Collaborative, (CCAC) and the Central Valley Air Quality Coalition (CVAQ) to assess and measure air quality in disadvantaged communities that are more heavily burdened by pollution due to their proximity to oil and gas facilities, distribution centers, incinerators, and biomass facilities.

We've also played a lead role in building expertise in community air quality monitoring associated with AB 617 and other efforts. CCEJN has successfully partnered with communities in conducting and establishing local, community-based air monitoring projects in communities such as Lanare, Terra Bella and Lamont. CCEJN has a rich history of partnering with and helping to build capacity with other community-based organizations such as the Madera Community Coalition for Justice. Founded in 2001, Madera Youth Leaders (MYL) promotes youth leadership and civic participation in high school and college students through led research, planning and advocacy.

If the grant is awarded and if CCEJN is selected as a subrecipient, we acknowledge the specific roles and responsibilities we will fulfill in support of the La Vina component of the CARB Community Air Monitoring project, described below.

- Advising CARB on how best to meaningfully engage with residents of the La Viña community and helping to design a community engagement plan to include all aspects of the project.
- In partnership with the Madera Coalition, support the recruitment of members from Madera Youth Leaders to participate in sampling and monitoring activities,
- Providing expertise in fostering community science by advising CARB on how best to engage residents in sampling design, data integrity, and interpretation of data, and
- Modeling culturally competent education and engagement to help build CARB's capacity to work with monolingual Spanish speakers.

Whether or not CCEJN is selected as a subrecipient, CCEJN supports this monitoring project and will work to leverage our years of dedicated partnership with the La Viña community to help advance the larger goals of the project. We look forward to working with you in the identification of air quality data to support the elimination of health disparities and work towards justice and equity for the residents of La Vina.

Sincerely,

Nayamin Martinez, MPH
Executive Director
Central California Environmental Justice Network
Nayamin.martinez@ccejn.org
559-907-2074

Department of Pesticide Regulation

Gavin Newsom
Governor

Julie Henderson
Director

Jared Blumenfeld
Secretary for Environmental Protection

March 16, 2022

Ms. Catherine Dunwoody, Chief
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Dear Ms. Catherine Dunwoody,

The California Department of Pesticide Regulation (DPR) is committed to our mission of protecting human health and the environment by regulating pesticide sales and use, and by fostering reduced-risk pest management. In collaboration with the California Air Resources Board (ARB), we support the proposal to the United States Environmental Protection Agency for a grant to fund the La Vina Community Air Monitoring Project. This project will support the monitoring of ambient air conducted to evaluate various pollutants of concern in communities with environmental and health outcome disparities stemming from pollution. DPR supports this grant application and the local community efforts to monitor its own air quality and promote air quality monitoring partnerships between communities, state, and local governments.
This grant would further DPR's strategic goals to protect all people in California, regardless of race, culture, income, or geographical location, from adverse environmental and health effects of pesticides.

DPR's Air Program has been involved in several AB 617 communities and has collaborated with ARB, Office of Environmental Health Hazard Assessment, Air Districts, and local residents in Oakland, Imperial, Shafter, South Central Fresno, Wilmington, Carson, West Long Beach, and Eastern Coachella Valley to provide support and guidance on pesticides of interest. DPR's Air Program has had recent discussions with La Vina community-based organizations about their pesticide concerns, which included technical guidance on available pesticide monitoring approaches, and provided information on potential benefits and challenges of monitoring options, specifically tailored to La Vina and its residents.

Through this letter, we acknowledge the specific roles and responsibilities we will fulfill in this partnership. In the event this proposal is funded, we would expect our collaboration in the La Vina Community Air Monitoring Project to include:

- Continuing partnership with the La Vina community providing technical guidance and expertise to support public meetings and discussions related to pesticides.
- If the community prioritizes pesticide monitoring, DPR will work with ARB and the community to provide guidance developing monitoring procedures. This will include

providing expertise on the appropriate equipment, monitoring procedures, and methods needed to collect air samples.

- Once laboratory results are available, DPR will also assist in evaluating data quality of the monitoring results and aid the community on data interpretation.

ARB will assume lead responsibilities for the La Vina Community Air Monitoring Project and will collaborate with the La Vina community to design and conduct ambient air monitoring.

We look forward to working with you to engage with community members, enable the community to monitor its air quality, and assist La Vina residents in addressing pesticide concerns.

Sincerely,

Nan Singhasemanon
Assistant Director
Department of Pesticide Regulation
916-445-3984

cc: Mr. Minh Pham, Branch Chief, Environmental Monitoring Branch

LEADERSHIP COUNSEL FOR JUSTICE & ACCOUNTABILITY

March 16, 2022

California Air Resources Board
1001 I Street, 6th Floor
Sacramento, California 95814

Dear Catherine Dunwoody,

Leadership Counsel for Justice and Accountability ("Leadership Counsel") is pleased to support the California Air Resources Board's ("CARB") proposal to the U.S. Environmental Protection Agency ("USEPA") for a grant to fund a Community Air Monitoring project in two communities, including La Viña, California. This project will conduct ambient air monitoring of pollutants, which aligns with LCJA's core strategy of "co-powerment," or the acknowledgment of equal power held by residents, communities, partners, decision-makers, and other stakeholders and the importance of working together to leverage expertise to identify priorities and develop solutions. Leadership Counsel has extensive experience working with San Joaquin Valley communities impacted by the greatest environmental and health disparities stemming from pollution, and exclusively work and partner with these communities. We strongly support this grant application and the focus on community efforts to monitor their air quality and promote air quality monitoring partnerships between communities, state, and local governments.

Leadership Counsel works alongside the most impacted communities to advocate for sound policy and eradicate injustice to secure equal access to opportunity regardless of wealth, race, income, and place. Through community organizing, research, legal representation, and policy advocacy, Leadership Counsel guides environmental policy while working with community leaders and organizational partners to identify climate change impacts and prioritize strategies for improved air quality and health outcomes through local, regional, and state efforts. We partner with a dedicated community group of about 40 La Viña residents, with whom we have been working for several years. We also maintain a collaborative partnership with the Central California Environmental Justice Network ("CCEJN") in achieving health equity.

Over the past eight years, Leadership Counsel has made great strides in ensuring community voices are at the forefront of decision-making processes that affect their neighborhoods in terms of air quality as well as other environmental justice issues.

If the grant is awarded and if Leadership Counsel is selected as a subrecipient, we acknowledge the specific roles and responsibilities we will fulfill in support of the La Vina component of the CARB Community Air Monitoring project, described below.

- Serve as a key partner in meaningful engagement with the La Viña community through helping to implement engagement strategies such as phone banking, in-person door-to-door outreach, and the review and vetting of communication materials developed by CARB and DPR.

Regardless if Leadership Counsel is selected as a subrecipient, we support this monitoring project and will work to leverage our years of experience in co-powerment and meaningful

engagement with the La Viña community to help advance the larger goals of the project. We look forward to working with you in the identification of air quality data to support the elimination of health disparities and work towards justice and equity for the residents of La Vina.

Sincerely,

Madeline Harris
Regional Policy Manager
Leadership Counsel for Justice and Accountability
2210 San Joaquin St.
Fresno, CA 93721

March 22, 2022

California Air Resources Board
1001 I Street, 6th Floor
Sacramento, California 95814

Dear Catherine Dunwoody,

I write on behalf of my personal concerns for the community of Maywood/Vernon/Bell/Commerce in support of the California Air Resources Board's proposal to the United States Environmental Protection Agency (USEPA) for a grant to fund the CARB Community Air Monitoring project to conduct ambient air monitoring of pollutants of greatest concern in two communities with environmental and health outcome disparities stemming from pollution.

I strongly support this grant application and the focus on supporting community and local efforts to monitor their air quality and promote air quality monitoring partnerships between communities, state, and local governments.

Since 2017 I have worked as an environmental justice advocate and participated on AB 617 CSC, CARB and AQMD work groups. I am also a stakeholder in a CEQA project that is identifying what should be considered in development of guidance for analyzing cumulative impacts from air toxics.

I support this monitoring project and will work to leverage our years of dedicated partnership with the Maywood/Bell/Commerce/Vernon community to help advance the larger goals of the project. I look forward to working with you in the identification of air quality data to support the elimination of health disparities and work towards justice and equity for the residents of Maywood/Bell/Commerce/Vernon.

Sincerely,

DocuSigned by:
Moses Huerta
2E2AC4D19288415...

Moses Huerta

CCAC
CENTRAL CALIFORNIA
ASTHMA COLLABORATIVE

March 10, 2022

California Air Resources Board
1001 I Street, 6th Floor
Sacramento, California 95814

Dear Catherine Dunwoody,

I'm writing on behalf of the Central California Asthma Collaborative (CCAC) in support of the California Air Resources Board's proposal to the United States Environmental Protection Agency (USEPA) for a grant to fund the CARB Community Air Monitoring project to conduct ambient air monitoring of pollutants of concern in a San Joaquin Valley community with environmental and health outcome disparities stemming from air pollution. We strongly support this grant application and the focus on supporting community and local efforts to monitor air toxics and criteria pollutants and promote air quality monitoring partnerships between communities, state, regional and local government agencies.

CCAC's mission is to provide education and direct services, build regional capacity and advocate for sensible policies that improve health and address inequities by reducing environmental impacts and emphasizing the prevention and management of chronic disease. The history of our organization is rooted in health disparities, specifically asthma, which disproportionately impacts communities across the San Joaquin Valley due to decades of poor air quality and non-attainment of health-based standards for PM2.5 and ozone. We provide asthma support services to low-income families across the San Joaquin Valley.

CCAC has played a leadership role in guiding the implementation of the state's AB 617 program, which is designed to drive community-scale air quality protection. We are represented on the AB 617 Consultation Group and on community steering committees in the San Joaquin Valley that are implementing strategies to improve air quality. We've also played a lead role in building expertise in community air quality monitoring associated with AB 617 and other efforts. We partner with more than a dozen community-based organizations that comprise the San Joaquin Valley Environmental Justice Steering Committee to implement a Valley-wide community air monitoring network that provides real-time, local air quality data and text message alerts to residents in disadvantaged communities that are most heavily burdened by air pollution.

If the grant is awarded and if CCAC is selected as a subrecipient, we acknowledge the specific roles and responsibilities we will fulfill in support of the La Vina component of CARB's Community Air Monitoring project, described below.

- Advising CARB on how best to meaningfully engage with residents of La Viña and helping to design a community engagement plan to include all aspects of the project.
- Recruiting members from Madera Youth Leaders to participate in sampling and monitoring activities,

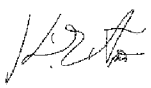
CCAC
CENTRAL CALIFORNIA
ASTHMA COLLABORATIVE

- Providing expertise in fostering community science by advising CARB on how best to engage residents in sampling design, data integrity, and interpretation of data, and
- Modeling culturally competent education and engagement to help build CARB's capacity to work with monolingual Spanish speakers.

CCAC supports this monitoring project and will work to leverage the activities of our recently awarded AB 617 Community Air Grant, which includes engagement with rural communities in Madera County, including La Vina, to develop community emission reduction plans based on strategies identified and adopted communities participating in CARB's AB 617 Community Air Protection Plan, to advance the goals of the project.

We look forward to working with CARB in the collection and dissemination of air quality data to support the elimination of health disparities and work towards justice and equity for the residents of La Vina and other disadvantaged communities of the San Joaquin Valley.

Sincerely,



Kevin Hamilton, Co-Executive Director
Central California Asthma Collaborative
4991 E. McKinley Ave Suite 109
Fresno, CA 93727

CPU has played a leadership role in guiding the implementation of the state's AB-617 program, which is designed to drive community-scale air quality protection. We have conducted our own Maywood Specific air monitoring grant installing 20 purple air monitors in the local area, and a multi-metals monitor at Heliotrope Elementary school. We also participate in many community meetings regarding monitoring due to the fact that we are next to the industrial cities of Vernon and Commerce.

If the grant is awarded and if CPU is selected as a sub-recipient we acknowledge the specific roles and responsibilities we will fulfill in support of the Maywood/Bell/Vernon/Commerce community component of the CARB Community Air Monitoring project described below.

Advising CARB on how best to meaningfully engage with residents of the Maywood/Bell/Vernon/Commerce community and helping to design a community engagement plan to include all aspects of the project.

Providing expertise in fostering community science by advising CARB on how best to engage residents in sampling design, data integrity, and the interpretation of data, and

Modeling culturally competent education and engagement to help build CARB's capacity To work with monolingual Spanish speakers.

Whether or not CPU is selected as a subrecipient, CPU supports this monitoring project and will work to leverage our years of dedicated partnership with the Maywood/Bell/Vernon/Commerce community to help advance the larger goals of the project.

We look forward to working with you in the identification of air quality data to support the elimination of health disparities and work towards justice and equity for the residents of Maywood/Bell/Commerce/Vernon.

Sincerely;

Felipe Aguirre
Director

MWC - Methane

DECLARATION OF JANE WILLIAMS

I, Jane Williams, declare and state as follows:

1. I am over 21 years of age and suffer from no impairment or disability affecting my ability to give truthful testimony. I have personal knowledge of the facts set forth below.

2. I am the Chair of the Sierra Club's National Clean Air Team and I have been an active member of the Sierra Club since 1997. Sierra Club's National Clean Air Team is responsible for air pollution matters, including litigation, policy and providing direct support to Sierra Club's members and local communities facing serious air pollution problems. I am also the Executive Director of California Communities Against Toxics as well as an active member and volunteer for other environmental organizations working to reduce air pollution in California and across the county, including for Desert Citizens Against Pollution.

3. The Sierra Club is a national, non-profit organization incorporated under the laws of California, with its principal place of business in Oakland, California. The Club's purposes are to explore, enjoy, and protect the wild places of the Earth; to practice and promote the responsible use of the Earth's ecosystems and resources; to educate and enlist humanity in the protection and restoration of the quality of the natural and human environment; and to use all lawful means to carry out these objectives. Sierra Club members are greatly concerned about air quality, and the Club has a long history of involvement in air quality activities on both the local and national levels.

4. I have been involved in efforts to reduce air pollution from waste disposal activities, including municipal solid waste ("MSW") landfills and incinerators, for decades. For example, between approximately 1990 and 2005, I was involved in efforts to stop three proposed MSW landfills in Southern California, including the Mesquite Landfill in Carroll County.

5. I also know from personal experience that Sierra Club has a strong interest in the accuracy of emissions data and in emission factors specifically. I know that Sierra Club regularly raises concerns about the quality of emission factors in comments on federal rulemaking processes and regularly comments on the importance of EPA obtaining emissions data through Information Collection Requests ("ICRs") and using that information to update emission factors.

6. In my role at Sierra Club, I was also involved in the development of the Compliance and Emissions Reporting Data Interface ("CEDRI"), which is used by EPA to gather data that is used to update some emission factors. Facilities that are subject to rules issued under sections 112 and 129 of the federal Clean Air Act, which include MSW landfills, are required to report to CEDRI at least every five years. I know that Sierra Club raises the importance of submitting information to CEDRI when submitting comments on regulations issued under sections 112 or 129 of the Clean Air Act. .

7. I also know that Sierra Club regularly participates in permitting and regulatory processes intended to control air pollution from large sources like MSW landfills. Among other things, Sierra Club regularly submits comments on permits issued under the Clean Air Act, including Prevention of Significant Deterioration permits for new or expanded air pollution sources and Title V permits allowing the operation of air pollution sources. I am aware that Sierra Club has also invested significant time in pushing for compliance with parts of the Clean Air Act that govern ozone nonattainment areas, especially regarding emissions of nitrogen oxides, a pollutant that contributes to the formation of ground-level ozone.

8. One of the core functions of my role as Chair of Sierra Club's National Clean Air Team is to provide information and advice to activists, including Sierra Club members, who are working on local campaigns to reduce air pollution from facilities. I respond to questions from activists throughout the country who seek input and advice about campaigns to reduce or prevent air pollution. This includes local fights to oppose new or expanded MSW landfills or to control air pollution from existing landfills. For example, I have been contacted recently by activists in

California Communities Against Toxics
Post Office Box 845 * Rosamond, CA 93560
661-256-2101 * Dcapjane @aol.com

To: Whom It May Concern
Date: May 24, 2022
Regarding: Support for USEPA Air Monitoring Grant

Our organization works with communities throughout California to reduce air pollution. Our efforts have now spanned over three decades. We have worked to reduce both criteria pollutants and air toxics emissions in California's most highly impacted communities. We advocated for, and helped decelop, CalEnviroScreen, California's environmental justice tracking tool which identifies which communities in California are most impacted from a number of pollution sources, including particulate matter.

We advocated adding PM 2.5 satellite monitoring data to CalEnviroscreen because of our concerns about the adverse public health impacts from PM 2.5 exposure. We are aware of the fact that PM 2.5 has a metal fraction that contributes significantly to its risk profile. We are very interested in knowing what that metal fraction is, and being able to track emissions back to their sources using speciation data.

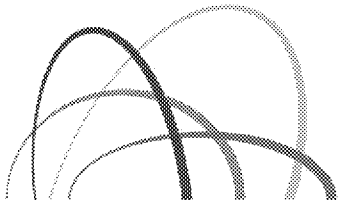
The California Air Resources Board (CARB) is proposing to do air monitoring in some of our most highly impacted census tracts in Southern California to get at this information. Specifically they propose to deploy a combination of canisters and filter based monitors. The filter based monitors will be from the purchase of portable monitors similar to the PQ100s used by SCAQMD for their metal monitoring in Paramount and Compton which our organization was instrumental in advocating for due to the presence of 4 foundries and a number of hexavalent chromium sources in Paramount. CARB hopes to capture several locations and identify a suite of metals using an XRF. CARB also has a Cooper continuous XRF sampler which it may be able to deploy during this same sample program. CARB is planning on using the data and the data collection from several locations in highly impacted communities to help us develop more of a comprehensive approach to community monitoring of air toxics and potential reduction strategies for those emissions.

Our organization supports CARB's efforts to work with highly impacted communities to test for PM 2.5 and speciate the metals content of the PM. We look forward to working with them and our other partner organizations in Southern California to engage in this monitoring campaign and working collaboratively with them with our existing monitoring campaigns in Southern California. Please don't hesitate to contact me with any questions or concerns regarding our support for this project, we are eager to collaborate with any agencies interested in this effort.

Cordially,

Jane Williams

Jane Williams
Executive Director



CALIFORNIA
AIR RESOURCES BOARD

Quality Assurance Project Plan For The Study of Neighborhood Air Near Petroleum Sources

Date: May, 2019

Prepared By: MLD

California Air Resources Board
Monitoring and Laboratory Division
1927 13th Street
Sacramento, CA 95811

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FOREWORD

This Quality Assurance Project Plan (QAPP) for the California Air Resources Board's (CARB) Study of Neighborhood Air near Petroleum Sources (SNAPS) Program is a comprehensive document that describes in detail the necessary quality assurance, quality control, and all other technical activities implemented to ensure that program-specific work satisfies required performance criteria. This QAPP has been developed to be consistent and conform to all applicable laws and regulations, CARB's Quality Management Plan (QMP) and quality assurance policies. This QAPP was developed using the U.S. EPA Quality Assurance regulations and guidance described in *EPA QA/R-5, EPA Requirements for Quality Assurance Project Plans* and the accompanying document *EPA QA/G-5, Guidance for Quality Assurance Project Plans.* All pertinent elements of regulations and guidance are referenced in this QAPP. This document is designed to be used in conjunction with applicable SNAPS Monitoring Plans.

APPROVALS		
California Air Resources Board		
	Signature	**Date**
Mike Miguel, Assistant Division Chief Monitoring and Laboratory Division		5/17/19
Kenneth Stroud, Chief Community Air Monitoring Branch		4-10-19
Michael Werst, Chief Northern Laboratory Branch		4.16.19
Manisha Singh, Chief Quality Management Branch		4.26.19
Vacant, Chief Oil & Gas and GHG Mitigation Branch	Acting Carolyn Lozo	4-17-19

SECTION A2 – TABLE OF CONTENTS

LIST OF ACRONYMS	
AMTS	Air Monitoring Techniques Section
AQDA	Air Quality Data Action
ASTM	American Society for Testing and Materials
BAM	Beta Attenuation Monitor
BC	Black Carbon
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CAMB	Community Air Monitoring Branch
CAN	Corrective Action Notification
CARB	California Air Resources Board
CDMS	Community Data Management System
CFR	Code of Federal Regulations
CH4	Methane
CO	Carbon Monoxide
CO2	Carbon Dioxide
COC	Chain of Custody
Cr6+	Hexavalent Chromium
DQA	Data Quality Assessment
DQO	Data Quality Objectives
EPA	Environmental Protection Agency
GC	Gas Chromatography
GCMS	Gas Chromatograph/Mass Spectrometer
GHG	Greenhouse Gas
GIS	Geographical Information System
H2S	Hydrogen Sulfide
ISD	Industrial Strategies Division
LIMS	Laboratory Information Management System
MLD	Monitoring and Laboratory Division
MQO	Measurement Quality Objectives
MS	Mass Spectrometer
NAAQS	National Ambient Air Quality Standard
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NLB	Northern Laboratory Branch

NO2	Nitrogen Dioxide
O3	Ozone
OEHHA	Office of Environmental Health Hazard Assessment
OGGHGMB	Oil & Gas and Greenhouse Gas Mitigation Branch
OT	Outside Temperature
PAHS	Polycyclic Aromatic Hydrocarbons
PAMS	Photochemical Assessment Monitoring Stations
PAS	Program Assessment Section
PM	Particulate Mater
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QAS	Quality Assurance Section
QC	Quality Control
QMB	Quality Management Branch
QMP	Quality Management Plan
QMS	Quality Management Section
SLAMS	State and Local Air Monitoring Stations
SNAPS	Study of Neighborhood Air Near Petroleum Sources
SOP	Standard Operating Procedure
SPM	Special Purpose Monitors
SVOC	Semi Volatile Organic Compound
TAC	Toxic Air Contaminant
TTP	Through the Probe Audit
U.S. EPA	United States Environmental Protection Agency
XRF	X-Ray Fluorescence
VOC	Volatile Organic Compound
WD	Wind Direction
WS	Wind Speed

SECTION A3 – DISTRIBUTION LIST

To ensure that California Air Resources Board's (CARB) quality assurance policies are appropriately distributed and inherent in all applicable ambient air quality data collection processes, the Quality Assurance Project Plan (QAPP) for the Study of Neighborhood Air near Petroleum Sources (SNAPS) is distributed to the following:

- Persons listed in APPROVALS section.
- CARB's Monitoring and Laboratory Division (MLD) supervisory and line staff involved in any aspect of the SNAPS Program.
- CARB's Industrial Strategies Division (ISD) supervisory and line staff involved in any aspect of the SNAPS Program.

Distribution is performed by placing this document on CARB's SNAPS website under resources at: https://ww2.arb.ca.gov/our-work/programs/study-neighborhood-air-near-petroleum-sources, sending an email notification via CARB's SNAPS Contact List Serve at: https://public.govdelivery.com/accounts/CARB/subscriber/new?topic_id=oil-gas, and maintaining hard copies at CARB's Industrial Strategies Division Office and Monitoring and Laboratory Division Office. The SNAPS Distribution List will be an excel document with all distributed parties email addresses housed on the Division internal drive. Training of staff within CARB's MLD and ISD will include QAPP content and location of all available quality assurance documents.

Table A.1 – Key Team Members to receive the QAPP

Name	Title	Project Role
Floyd Vergara	Industrial Strategies Division Chief	
Carolyn Lozo	Oil & Gas & GHG Mitigation Branch Chief	Sets study goals for community outreach and community selection.
Vacant/TBD	Program Assessment Section Manager	Community and Stakeholder Outreach, Community Selection and Prioritization, Results Evaluation and Final Report
Jonathan Blufer	Staff	Program Development Staff Lead
Michelle Watterson	Staff	Data Evaluation
Catherine Dunwoody	Monitoring and Laboratory Division Chief	
Mike Miguel	Monitoring and Laboratory Assistant Division Chief	Assist Division Chief
Kenneth Stroud	Community Air Monitoring Branch Chief	Technical and Operational Goals

Walter Ham	Advanced Monitoring Techniques Section Manager	Program monitoring oversight; implementing neighborhood monitoring near oil and gas facilities.
Chris Jakober	Staff	Mobile Monitoring Staff Lead
Tony Simoni	Staff	Assist Manager
Jeremy Smith	Staff	Assist Manager
Yunliang Zhao	Staff	Program Staff Lead
Manisha Singh	Quality Management Branch Chief	Quality Assurance–Certification, Verification, Accuracy and Precision
Ranjit Bhullar	Quality Assurance Section Manager	Assist with performance audits, and certification and verification for calibration standards
Vacant/TBD	Quality Management Section Manager	Oversees Program Quality Assurance, Documents – QAPP, SOPs
Jeannine Berry	Staff	Assist Manager
Michael Werst	Northern Laboratory Branch Chief	Provides laboratory chemical analysis for Program.
Patrick Rainey	Organic Laboratory Section Manager	Oversees Canister Samples Analyses
Leslie Larson	Staff	Assist Manager
Cathleen Roush	Staff	Assist Manager
Brenda Saldana	Inorganic Laboratory Section Manager	Oversees media preparation and supply to staff and performs all inorganic laboratory analyses
Nial Maloney	Staff	XRF analyses

SECTION A4 – PROGRAM/TASK ORGANIZATION

A4.1 – Introduction

California Air Resources Board's (CARB) mission is to protect the public from harmful effects of air pollution. Enhancing community air monitoring near disadvantaged communities and other highly impacted communities enables us to better meet our mission. While communities near oil and gas production and distribution are the initial focus of this program, the program may include monitoring in communities near other petroleum related processes.

CARB currently monitors regional air quality using fixed monitoring stations. This monitoring network can have stations relatively far away from each other since this network is designed to assess regional concentrations. This spatial density and low

sampling frequency makes identifying specific sources of toxic volatile organic compound (VOC) emissions, methane, and other air pollutants at the community-scale challenging. An expansion of CARB's current monitoring efforts is needed to improve CARB's neighborhood/community-level monitoring as well as to quickly respond to events similar to the Aliso Canyon natural gas leak or other oil and gas production-related issues. Conducting such monitoring will enable CARB to better characterize neighborhood concentrations, assess potential health impacts, determine the need for further mitigation, as well as provide timely information to the public living near these sources.

The purpose of this Study of Neighborhood Air near Petroleum Sources (SNAPS/Program) Quality Assurance Project Plan (QAPP) is to document policy and activities and procedures necessary for accomplishing specified program objectives. This QAPP pertains specifically to monitoring ozone (O3), carbon monoxide (CO), methane (CH4), hydrogen sulfide (H2S), black carbon (BC), VOCs – benzene, toluene, ethylbenzene and xylene (BTEX), metals, carbonyls, glycols*, particulate matter (PM) and polycyclic aromatic hydrocarbons (PAH). This QAPP shall comply with all CARB's quality assurance policies and procedures to ensure the quality of data reported meets all program objectives.

CARB management policy requires that sufficient quality assurance activities be conducted to demonstrate that all data collected by, and on behalf of, CARB are scientifically and legally valid for the purposes for which they are intended.

All oil and gas and petroleum source oriented air monitoring activities performed by Program staff within CARB or performed on behalf of CARB shall comply with the quality assurance policies and procedures specified in this QAPP. Each program monitoring staff has the responsibility for ensuring that the operation of the neighborhood air monitoring is conducted in accordance with approved procedures and data are of sufficient quantity and quality to meet intended objectives. CARB's goal is to work cooperatively and collaboratively to consistently produce high quality air monitoring data. The quality assurance system and procedures set forth in this document apply to CARB and all SNAPS Program staff unless alternative quality management documents and procedures are approved by CARB. All substantive deviations to this QAPP must be documented in an Addendum and reviewed by CARB for approval. The Addendum process is described in CARB's Document Repository at: https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-management-document-repository.

This QAPP has been developed based on recommendations from U.S. EPA QAPP information set forth in the document Guidance for Quality Assurance Project Plans,

* *Measurement of the analyte(s) will be dependent on local emission sources, initial field measurements of other related chemical species, and the availability of suitable sampling/analytical equipment.*

U.S. EPA QA/G-5, December 2002. This document is divided into the element groups summarized in Table A.2 – QAPP Elements.

Table A.2 – QAPP Elements

	Section A – Program Management		Section B – Data Generation and Acquisition		Section C – Data Verification and Validation
A1	Title and Approval Sheet	**B1**	General Sampling Process Design	**C1**	Data Review, Verification, and Validation
A2	Table of Contents	**B2**	Monitoring Methods	**C2**	Verification and Validation Methods
A3	Distribution List	**B3**	Sample Handling and Custody		
A4	Program/Task Organization	**B4**	Quality Control		**Group D – Assessment, Oversight, and Usability**
A5	Program Definition and Background	**B5**	Instrument/Equipment Calibration and Frequency	**D1**	Assessments and Response Actions
A6	Program Description	**B6**	Instrument/Equipment Testing, Inspection, and Maintenance	**D2**	Reports to Management
A7	Quality Objectives and Criteria For Measurement Data	**B7**	Inspection/Acceptance of Supplies and Consumables		**Appendix**
A8	Special Trainings and Certifications	**B8**	Data Management		
A9	Documents and Records				

A4.2 – Program/Task Organization

CARB's organizational structure for the SNAPS Program is displayed in this QAPP, (Section A4.2, Figure A.1). The SNAPS Program is the responsibility of the Monitoring and Laboratory Division (MLD) and the Industrial Strategies Division (ISD) within CARB. The general responsibilities of these two divisions are outlined in this section and can be found on the SNAPS website. (Further reference to the SNAPS Website in the text of this document will be hyperlinked. Appendix 8 contains a list of website links used throughout this document for reference.) The SNAPS website will include a call-out box with the latest updated program news, public meeting schedules, archives with presentations and other documents, real-time information, program contact information and a link for GovDelivery (listserv) subscription. Additionally, all published documents

from the SNAPS Program – QAPP, final reports for each community, Program Questions and Answers – will be posted on the website.

Within MLD, the Community Air Monitoring Branch (CAMB) conducts most of CARB's continuous community-scale ambient air monitoring activities throughout California, which may include seasonal and toxic air monitoring. The Advanced Monitoring Techniques Section (AMTS) within the branch is responsible for the development and operation of mobile monitoring and stationary monitoring within the communities for the SNAPS Program. AMTS conducts community monitoring using mobile air monitoring stations and equipment. All monitoring equipment is assigned to qualified Program staff who are responsible for station operation, quality assurance/quality control (QA/QC) activities, data management, preventive maintenance, and minor repairs of sampling equipment. In addition, AMTS staff is responsible for the verification and validation of data obtained and collected. The section supports the SNAPS Program by performing measurements and providing data to help define the nature, extent, and trend of the problem.

The two sections of the Quality Management Branch (QMB) that are involved with the SNAPS Program are the Quality Assurance Section (QAS) and the Quality Management Section (QMS).

QAS has the primary responsibility for conducting performance audits of the field monitoring instrumentation used in support of CARB's regulatory air monitoring program. Audits of special monitoring programs may also be conducted to ensure that data quality meets the purpose and objectives of the monitoring program. QAS will assist AMTS with the performance audits with a focus on criteria pollutants measured. QAS is responsible for issuing corrective action requests and initiating appropriate corrective action responses for issues discovered during performance audits. QAS may also assist Program staff with providing certification and verification services for calibration standards.

QMS is responsible for the development, preparation and review of the SNAPS QAPP as well as the review and approval of other Program quality management documents, such as SOPs, to ensure that consistent practices are performed. QMS also acts as liaison between Divisions within CARB and local monitoring organizations and assists QAS with audits and corrective action processes as needed. These activities are conducted to ensure compliance with applicable requirements pertaining to sample collection and analysis, and validation and reporting of ambient air monitoring data.

Within ISD, the Program Assessment Section (PAS) is responsible for the development and planning of the SNAPS Program. Staff also design studies to determine methane, criteria, and toxic air pollutant emissions from oil and gas extraction. PAS is also responsible for public outreach and education on the SNAPS Program.

Below is an organizational function summary for CARB and SNAPS Program staff. Please note that dotted lines indicate oversight.

Figure A.1 – CARB and SNAPS Organizational Function Summary

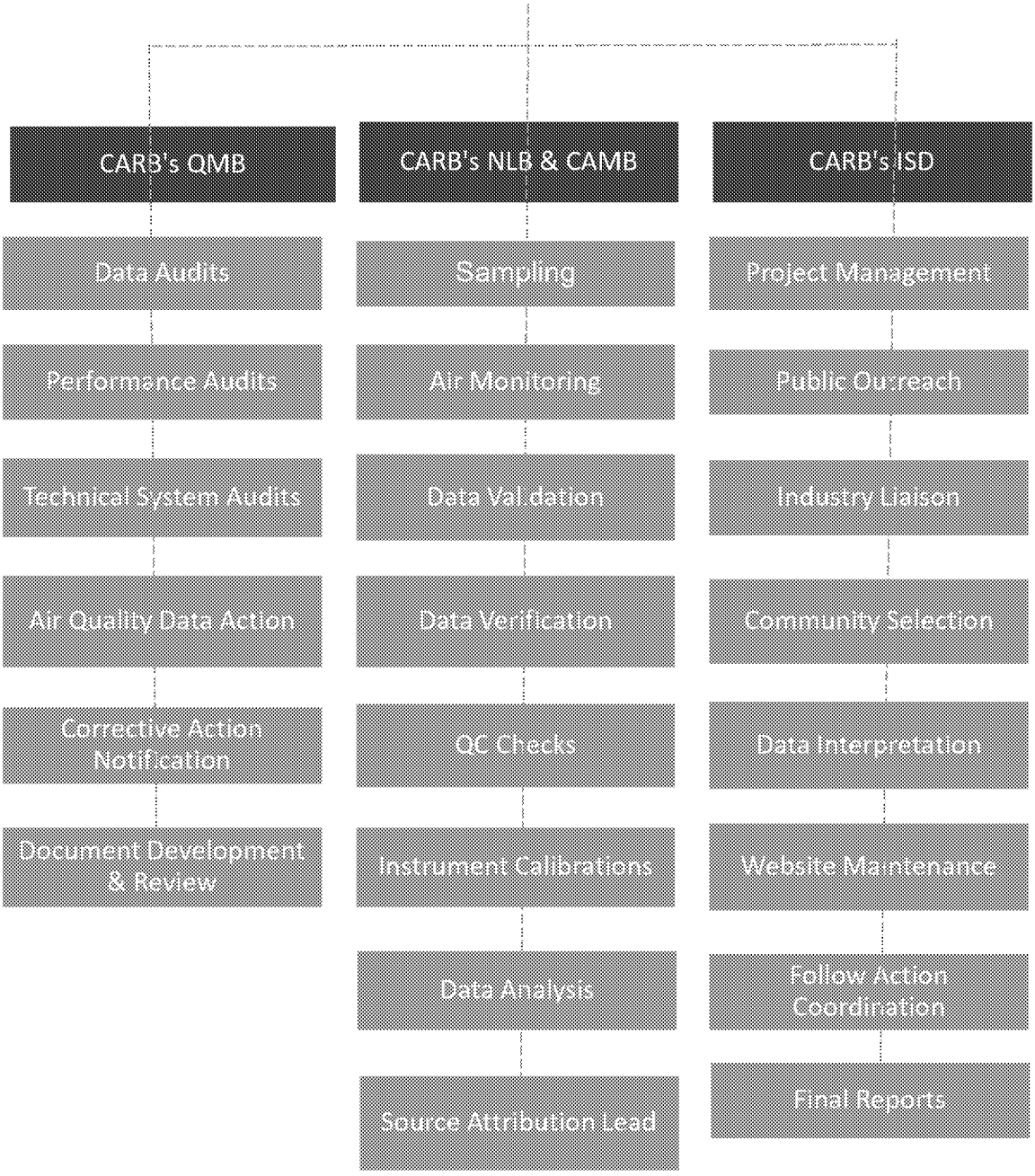

Figure A.1 shows the general functions and lines of communication for the Divisions involved in the SNAPS Program. Responsibilities are outlined in Table A.3, relevant Standard Operating Procedures (SOP), and the SNAPS website.

Specific responsibilities for the SNAPS Program are outlined in the QAPP and will be posted on the SNAPS website.

A4.3 – Responsibilities

Table A.3 shows the general responsibilities and lines of communication for staff involved in the SNAPS Program. More detailed description of specific responsibilities for various positions are identified in related SOPs.

Table A.3 – SNAPS Position Responsibilities

Position	Responsibilities	Reports To
Industrial Strategies Division, Chief	Responsible for the successful oversight of the Program.	Executive Staff
Oil & Gas & GHG Mitigation Branch, Chief	Responsible for development of the Program; development of methane and criteria pollutant control measures from oil and gas extraction and mitigation.	Division Chief
Program Assessment Section, Manager	Responsible for public outreach for Program; oversees staff working on oil and gas analysis including methane leakage, hydraulic fracturing.	Branch Chief
ISD Staff	Program development and public outreach.	Section Manager
Monitoring and Laboratory Division, Chief	Responsible for the successful accomplishment of Program objectives.	Executive Staff
Northern Laboratory Branch, Chief	Develops laboratory and ambient air collection test procedures, performs near source ambient air monitoring, conducts analyses of ambient air samples and consumer products, and provides technical assistance to clients.	Division Chief
Inorganic Laboratory Section, Manager	Responsible for analyzing ambient air quality samples, and managing and reporting analytical data, specifically from particulate matter (PM), metals, and toxic air contaminants (TAC).	Branch Chief
Organic Laboratory Section, Manager	Performs determinations for halogenated organics, aromatics, and carbonyl compounds.	Branch Chief

Quality Management Branch, Chief	Responsible for the quality assurance of the Program; and the timely review, implementation, and assessment of quality management documents and systems for the Program.	Division Chief
Quality Assurance Section, Manager	Responsible for certification services for ozone transfer standards and verification of pollutant concentrations in compressed gas cylinders used for field calibrations of the pollutant analyzers. Provide performance audits for gaseous pollutants; flow checks for PM 2.5.	Branch Chief
Quality Management Section; Manager	Liaisons responsible for communication and coordination of QA/QC information; assist branch chief with the preparation and review of quality management documents for consistent practice with the Program.	Branch Chief
Community Air Monitoring Branch, Chief	Responsible for overseeing air monitoring activities and the verification and validation of air monitoring data.	Division Chief
Advanced Monitoring Techniques Section, Manager	Responsible for Program oversight; implementing neighborhood monitoring near oil and gas facilities.	Branch Chief
CAMB Staff	Responsible for developing and following QAPP and SOP requirements while operating air monitoring equipment, maintaining sampling stations, and repairing and calibrating instruments; QA/QC activities; Data management; Verification and validation of air monitoring data and equipment.	Section Manager

SECTION A5 – PROGRAM DEFINITION AND BACKGROUND

California is one of the largest oil producers in the nation, fourth only to Texas, North Dakota, and Alaska and the Division of Oil, Gas and Geothermal Resources (DOGGR) ranked California in the nation's top 5 for oil production. As of April 16, 2019, DOGGR states that in California there are approximately 73,000 active wells and 122,000 plugged wells some of which have existed for over one hundred years. This aging infrastructure along with the oil and gas extraction activities has the potential to impact nearby communities and current regulatory monitoring sites are not designed for the determination of community air quality. Limited information exists on the impacts that oil and gas operations may have on the air quality in neighboring communities and a need for monitoring is recognized. As a result, CARB has initiated the SNAPS Program in response to community concerns and this Program plans to focus on assessing the cumulative air contaminants in communities of heavily populated neighborhoods residing within miles, some of which are located less than a mile, near oil and gas production facilities.

CARB's motivation for this program is the need to better characterize air pollutants that may be impacting communities near these oil and gas operations. Additional information on the background of the SNAPS Program can be found on the SNAPS website.

A5.1 – Current Air Quality Standards

Current State and Federal regulation defines Air Quality Standards for criteria pollutants, such as particulate matter (PM10 and PM2.5), carbon monoxide (CO), nitrogen dioxide (NO2), ozone (O3), and metals. The focus of this QAPP is the pollutant concentrations that exist in neighborhoods and communities near petroleum sources. Most pollutants thought to be associated with oil and gas production and storage facilities are not included in the National Ambient Air Quality Standards (NAAQS) and will be studied as part of this Program. These non-criteria pollutants are black carbon, carbonyls, glycols[†], hexavalent chromium, hydrogen sulfide, PAHs, metals, VOCs (including BTEX).

The current ambient air quality standards for each of the criteria pollutants and their effects on health are summarized in the State and Federal Ambient Air Quality Standards Table and footnotes which is located on the CARB website at: https://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Additional information can be found in the CARB QAPP for Gaseous Pollutant Air Monitoring Program (Gaseous QAPP) and

[†] *Measurement of the analyte(s) will be dependent on local emission sources, initial field measurements of other related chemical species and the availability of suitable sampling/analytical equipment.*

the CARB QAPP for Particulate Matter Pollutant Air Monitoring Program (PM QAPP) located in the CARB's Quality Management Plan (QMP) and QAPP website at: https://ww2.arb.ca.gov/our-work/programs/quality-assurance/qm-document-repository/quality-management-plans-and-quality .

A5.2 – Geographic Extent of Monitoring

The geographic extent of the sampling areas may vary depending upon the results of the site selection phase, the location of contributing emission sources, the meteorology, and the topographic features. Specific details on the monitoring area and the equipment to be used will be further described in site-specific monitoring plans.

SECTION A6 - PROGRAM DESCRIPTION

CARB will start by defining the considerations in selecting the monitoring sites for the study. This is the first phase of the program and an opportunity for the public to inform CARB about areas of concern for residential neighborhoods located near oil and gas operations.

CARB will incorporate community concerns and gather additional air quality data resulting in the selection of communities to be monitored each year. CARB will hold a local meeting in each selected community to provide information about the project and collaborate on where monitoring trailers will be located. A subset of near real-time measurements will be made available on the program's website, where available. Additionally, a final report will be prepared and posted for each monitored community. A follow-up local community meeting will be held to share the results of the report and any follow up actions that are necessary.

A6.1 – Community Selection

Community Selection Process – 3 stages: Identification, Evaluation, Selection. Detailed description can be found on the SNAPS website.

Identification Stage – Staff will develop a list of communities for potential selection based on an evaluation of the following criteria and information.

- Geographical Information System (GIS) analysis to determine areas with significant co-location of oil and gas production and populations
- Public and local air districts input for additional specific communities of concern.

Evaluation Stage – Staff will gather data from communities that may indicate a greater impact from oil and gas production emissions.

Selection Stage – Staff will use a multi-factor prioritization to select a sub-set of communities. Initially, communities identified as meeting four or more factors may be selected for the first round of SNAPS monitoring. Criteria may change as the Program evolves and further information is available and experience is developed.

A6.2 - Monitoring Methods

The SNAPS Program will utilize a variety of air monitoring methods to characterize air quality. These methods include stationary and mobile monitoring. The monitoring equipment used in each selected community will vary based on the phase of the monitoring.

The mobile air quality monitoring phase will utilize a low-emission mobile SUV-based platform for performing an initial survey of potential communities for further monitoring. The SUV will be equipped with a variety of screening-level instrumentation including instruments for continuous methane measurements and an auto-GC for BTEX measurements. The platform will also have the capability to collect discrete summa canister grab samples for subsequent analysis of VOCs by GC/MS, as needed.

The stationary, intensive sampling phase will include trailer-based monitoring platforms that will be deployed for a period of three to four months to gather more comprehensive and extensive information for identified communities through both on-site continuous measurements and discrete samples for laboratory analysis. On-site measurements include ozone, hydrogen sulfide, methane, carbon monoxide and carbon dioxide, VOCs (including BTEX), PM2.5, metals, black carbon, and meteorological parameters - wind speed (WS) and wind direction (WD). Discrete samples collected for laboratory analysis include VOCs, metals, Cr6+, and carbonyls, polycyclic aromatic hydrocarbons (PAH), and glycols[‡]. The pollutants analyzed in each selected community will be specified in the monitoring plan and will be based on information on local sources and historical data if available.

In addition to the above noted SNAPS-specific monitoring activities, data gathered from CARB and local district operated State and Local Air Monitoring Station (SLAMS) or special purpose monitoring (SPM) sites may be used to augment or provide additional data for decision making purposes.

[‡] *Measurement of the analyte(s) will be dependent on local emission sources, initial field measurements of other related chemical species, and the availability of suitable sampling/analytical equipment.*

A6.3 – Community Monitoring Site(s)

This program is designed so that each monitoring plan meets the following objectives:

1. Provide air pollution data to the general public in a timely manner.
2. Evaluate effectiveness of data to determine air quality-related cumulative health impacts on communities near petroleum sources.

To meet the two monitoring objectives, each monitoring trailer must be sited so that it is capable of sampling and measuring the air in a way in which the resulting data are representative of the area and appropriate for informing the public and program managers about various aspects of air quality. Staff will make an effort to meet and comply with the siting requirements established in regulations (Appendix E of Title 40, Part 58 of the CFR.) However, this may not be possible due to site availability, obstructions, or other factors.

The SNAPS Program may need to employ additional monitors or utilize additional data due to (1) the complexity of the terrain, (2) meteorology, (3) geographic size of region, (4) adjacent monitors, (5) pollutant formation mechanisms, (6) distribution of emissions and (7) quality control requirements.

Regulatory SLAMS instruments may be used to support monitors in the SNAPS Program.

SECTION A7 - QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Data Quality Objectives

Data quality objectives (DQOs) are critical for clarifying the purpose of the study, defining the information to collect, determining the appropriate conditions, and specifying the tolerable limits of potential decision errors. The DQO process is a strategic planning approach used to prepare for data collection activity. The objective of this process is to achieve data of known and appropriate quality to support decision-making. The process helps to ensure that the type, quantity, and quality of environmental monitoring data will be sufficient for their intended use, while ensuring no unnecessary, redundant, or insignificantly precise data are collected.

To ensure data quality, bias/drift are calculated using zero/precision checks for gas monitors and the GC-FID instrument, and the flow rate checks for particulate matter monitors and samplers is used as a proposed metric. Table A.4 outlines all acceptance criteria, audit schedules, and reference materials for SNAPS measurements. It should be noted that all data quality objectives are subject to change based on real-world field conditions.

Table A.4 – Routine QC Checks for SNAPS DQOs

Pollutants	Test	Audit schedule	Acceptance criteria for accuracy/precision	References
Continuous Measurement				
O_3	Zero/precision	Bi-weekly	Zero < 5 ppb; precision drift <7.1% of the calibration point	EPA QA Handbook
H_2S	Zero/precision	Bi-weekly	Zero < 5.1 ppb; precision drift <10.1% of the calibration point	EPA QA Handbook
$CH_4/CO/CO_2$	One-point standard check	Monthly	CH_4< 3 ppb; CO <50 ppb; CO2 < 0.5 ppm	Instrument Specifications
VOCs (PAMS mixture)	One-point standard check	Daily	Less than 20% from the calibration point	MLD SOP 066
$PM_{2.5}$	Flow check	Bi-weekly	Less than 4% of the set flowrate check	MLD NLB SOP 055
Black carbon	Flow check	Bi-weekly	Less than 4% of the set flowrate check	AQSB SOP 400
Discrete Sample				
PAHs (TO-13)	Flow check	Prior and after each sampling period	10% of the set flowrate check	EPA TO-13A
Carbonyls	Flow check	Semi-annual	5% of the set flowrate check	AQSB SOP 801
Glycols*	Flow check			
Metals	Flow check			
VOCs (MLD058 compounds) and sulfur containing compounds	Flow check	Semi-annual	5% of the set flowrate check	AQSB SOP 805

* Please see Table B.4 for each Pollutant SOP.

*DQOs displayed here are proposed for the monitoring in Lost Hills.

Table A.5 shows data completeness targets for all collected data at several time intervals. Data completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under normal conditions. Completeness will be assessed by reviewing field and laboratory data logs and field and laboratory logbooks to ensure that all data are validated within specified DQOs.

Table A.5 – SNAPS Data Completeness Targets

Completeness Target	Relevant to
75% of minute data	5-minute average data
75% of 5-minute data	1-hr average data
75% of hourly data	24-hr daily average data
75% of daily data	Monthly or quarterly average data

In developing DQOs, there are certain measurement quality objective (MQO) indicators that are important to determining uncertainty and reducing errors. All DQOs follow the formal seven step DQO process for the development of an experimental design to meet criteria specified by stakeholders in the decision, based on U.S. EPA QA/G-4, *Guidance for the Data Quality Objectives Process* (U.S. EPA, 1994 - https://www.epa.gov/fedfac/guidance-systematic-planning-using-data-quality-objectives-process), and in Section 3 of the *Quality Assurance Handbook for Air Pollution Measurement Systems* (U.S. EPA, 2011 - https://www3.epa.gov/ttn/amtic/qalist.html).

CARB will adopt DQOs previously developed by the U.S. EPA (e.g., all criteria pollutants, BTEX), and apply developed DQOs for the remaining SNAPS pollutants following U.S. EPA guidelines where appropriate. DQOs will differ based on the pollutant monitored and the equipment utilized. DQOs for non-routine or screening equipment will be routinely evaluated and may be updated as additional experience and data is available. The specific initial DQOs for the SNAPS pollutants can be found in the applicable pollutant SOP located in Section B2 – Monitoring Methods of this QAPP.

For requirements of gaseous criteria pollutants, please see the Gaseous QAPP which can be found on the Quality Management Document Repository website at: https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-management-document-repository. For continuous PM2.5 data, precision is determined by routine flow rate verification measurements. Please see the PM QAPP located at the Quality Management Document Repository: https://ww2.arb.ca.gov/our-work/programs/quality-assurance/qm-document-repository/quality-management-plans-and-quality.

SECTION A8 – SPECIAL TRAININGS AND CERTIFICATIONS

A8.1 – Personnel Qualifications

All Program employees, including managers must satisfy class specifications for all positions, including those performing quality assurance or environmental measurement functions. Class specifications and duty statements identify job duties and the minimum education, experience, knowledge, skills and abilities required to perform job duties for each specific position. Classification specifications are reviewed periodically for

relevance to applicable ambient air monitoring requirements, including current technology, instrumentation, and methodologies. A competitive interview process is required for all prospective staff to ensure that the most qualified candidates are considered by the hiring manager or authority.

A8.2 – New Employee Orientation and Training

New Program staff will receive on-the-job training from AMTS management and senior program staff. A duty statement is developed for each position and a plan for achieving performance objectives is included in an employee development plan. Each new staff member will read and adhere to all Program relative Manuals and SOPs applicable to the position for which they have been hired.

A8.3 – Ongoing Training and Continuing Education

Training needs are assessed on a continual basis by section managers. Each new staff member will be evaluated periodically after initial hire by the appropriate section manager. Training is offered as needed or required to maintain and improve the skills and knowledge of staff. All training is tracked and documented in individual personnel files by managers or their designee. Additionally, CARB encourages staff to participation in available and relevant training provided by outside agencies such as equipment manufacturers and U.S. EPA.

SECTION A9 – DOCUMENTS AND RECORDS

CARB and SNAPS Program staff generate and maintain a variety of quality management related documents and records. Documents include QAPPs, SOPs, quality control forms, technical bulletins, acceptance test procedures and other program documents and records. Data records include ambient air monitoring data and laboratory analysis results, sample reports, strip charts, and maintenance records and the Laboratory Quality Control Manual.

Effective document management includes a system for generating, updating, maintaining, and disseminating quality management related documents and records. All available documents for CARB SNAPS Program can be found on the SNAPS website. The procedures described below are those followed by SNAPS Program staff for quality management related documents and records, unless otherwise described in an approved addendum.

A9.1 – Responsibility for Documents and Records

The responsibility for identifying, preparing, and managing quality management documents and records lies with management of the group responsible for creation of the document or record. The responsible party shall work with QMB and ISD to incorporate a new document, revision or addendum to an existing document (i.e.,

QAPP, SOP, etc.) into the document control system. Only authorized personnel are granted access to edit or modify documents.

SNAPS Program staff within MLD and ISD will be responsible for maintaining a database of all current SNAPS Program quality management related documents. These documents can be found on the SNAPS website.

CAMB is responsible for maintaining a database of quality control documents related to the operation and maintenance of the community air monitoring program (SOPs, field maintenance forms, technical bulletins, acceptance test procedures, ambient air quality data, etc.). These documents are accessible through the SNAPS website.

A9.2 – CARB Document Retention Policy

Records and documents created or received by CARB are retained for a period of time as specified in CARB's Records Management Program, the Department of General Service's (DGS) Records Retention Schedule, or more stringent criteria as required by specific programs. As a general rule, CARB retains documents and records for a period of three years before transferring them to DGS for long term archiving.

A9.3 – SNAPS Program Document Tracking

The documentation format utilized by SNAPS Program for tracking and controlling quality management documents is described below. The system incorporates a standardized indexing format and provides for revisions without reissuing the entire document.

Each document is formatted to include a 4-line indexing format that includes the following information:

Line 1 – Branch and Document Number
Line 2 – Title or Description of Document
Line 3 – Document Revision Number and Revision Date
Line 4 – Page X of Y

An example of an indexing label is as follows:

AQSB SOP 001
API 400A Ozone Analyzer
Second Revision, August 2007
Page 1 of 50

Sections within a document can be added, modified, or deleted in one of two ways. When a document is modified, the revision number and revision date are changed on the Title Page, Table of Contents, and in the indexing label at the top of each page.

The Title Page will include SOP number, title, effective date, approval date and version. Alternatively, an addendum can be written for more minor exceptions or updates to a document and submitted to CARB's Quality Management Branch for review and approval. The SNAPS Program can utilize the CARB addendum process to describe program specific modifications to the quality management documents. These addendums will be retained with the parent document under the Program section of the CARB Document Repository.

Naming of all other SNAPS documents will have an informative title, SNAPS community name (or abbreviation), and date of last major edits. Documents will be stored on the Oil and Gas and Greenhouse Gas Mitigation Branch drive within the Industrial Strategies Division. The file system will be a hierarchy of folders to store monitoring plans, calibration data, monitoring data, etc.

A9.4 – Document Distribution

CARB's MLD is responsible for maintaining electronic files of CARB's quality management documents (i.e., QMP, QAPPs, SOPs, etc.). The documents are accessible on the SNAPS website, which is available to CARB personnel and the general public. The contents of the webpages are reviewed on a regular basis, and CARB management is responsible for dissemination of information to the appropriate personnel within their monitoring organization. The quality management document repository database is updated routinely, as needed.

A9.5 – Archiving of CARB Document and Records

Archiving of quality management documents and records is the responsibility of the Program section generating the document or record. Documents that are created and shared by multiple sections are maintained and archived by CAMB and all reports and records will be maintained by ISD. The section responsible for the document should maintain it in a digital and/or hardcopy format. A current version of the document or record shall be maintained in a designated electronic directory. Versions no longer in use are archived. Quality management documents are archived in digital format unless hardcopy originals are required to be kept by the program QAPP. Records and data that are originally captured in digital format should be archived in digital format, unless a hardcopy of the original record or data is also required to be archived by the program QAPP. Records and data that are originally captured in a hardcopy format should be archived in a hardcopy format. An archived document incorporates the word "Archive" in the title and it is transferred to an "Archived Document" directory.

Section managers or Program staff have the responsibility to maintain updated documents and to archive those that are no longer in use. In order to properly manage current and archived documents, two document directories shall be maintained. The "current document" directory is accessible to all staff. Current documents are defined as those currently in use by management and staff for programs in progress or

approved for implementation. The "archived document" directory is for all versions of documents that were previously in use. These documents and records provide a timeline indicating when a specific version of a document was in effect. Archived documents should remain available to all CARB personnel and Program staff. Hardcopy documents and records are archived on-site at CARB facilities or at an off-site secure storage facility contracted by CARB.

Table A.6 lists CARB's QA/QC record keeping, general laboratory, and air monitoring record keeping requirements. CARB implements a data management system for processing data streams from the continuous instruments. CARB has implemented a laboratory information data system for data centralization and sample tracking which can be found on the Laboratory QC Manual at: https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf .

Table A.6 – Data Record Formats and Locations

Document Name	Brief Description	Format	Storage Location
Training Files	Records substantiating the training and proficiency of staff relevant to this program	Hardcopy; Electronic	Varies by CARB section method
QAPP	Master version of QAPP, including pending revisions	Electronic	SNAPS Website: https://ww2.arb.ca.gov/our-work/programs/study-neighborhood-air-near-petroleum-sources
SOPs	Current version of all SOPs	Electronic	https://ww2.arb.ca.gov/laboratory-standard-operating-procedures-ambient-air
Performance Evaluations and Audits	Results of internal and external assessments	Electronic	QAS Audit Information System
Instrument User's Manual and/or Manufacturer's Instructions	Information for setting up, using, and troubleshooting the continuous gaseous monitors	Hardcopy; Electronically via manufacturer's websites for updates	Program staff; Online Instrument Manuals: https://www.arb.ca.gov/airwebmanual/instrument_manuals/index.php
Calibration Certificates and Records	Includes certificates for gases and other chemicals used for calibration	Hardcopy	Program staff; accompanying instruments
QC Records	Results of instrument blanks, calibrations, standard recoveries, and replicate precision	Hardcopy	Program staff; CARB Headquarters

Document Name	Brief Description	Format	Storage Location
Raw Data Records	Results of instrument analyses (including supporting data that are not uploaded to the database)	Electronic	Stored by CDMS

SECTION B1 – GENERAL SAMPLING PROCESS DESIGN

The SNAPS Program is designed so that sampling, instrument operation and siting criteria procedures and measurement data quality meet Program requirements and Program objectives. For a complete description of the general sampling process design, please refer to the individual monitoring plan for each specific site which can be found on the SNAPS website.

SECTION B2 – MONITORING METHODS

A description of the specific monitoring and analyses methods will be included in the monitoring plan developed for each specific site. These monitoring plans can be found on the SNAPS website.

This section identifies the monitoring methods and associated instrument SOPs for monitors that may be operated by SNAPS personnel during the SNAPS Program. SOPs document methods for analyzing ambient concentrations of air pollutants and include a list of required equipment to measure target pollutants, identify support facilities, and also describe the operation, maintenance, and repair of equipment. They also provide details regarding duties/responsibilities for field operators and QC needed to satisfy monitoring requirements.

The pollutants described in the SNAPS QAPP are analyzed using continuous monitors and discrete media based sampling and analysis. Discrete samples are collected in the field and then transported to a laboratory for analysis. Below is a brief description of the principal of operations for the primary oil and gas non-criteria pollutant monitor types operated in the SNAPS Monitoring Program. For each criteria pollutant, please see the appropriate QAPP at: https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-management-document-repository. More information on the principles of operation can be found in the SOPs and operation manual for each instrument. The manuals can be found at: https://www.arb.ca.gov/airwebmanual/instrument_manuals/index.php and the Laboratory SOPs can be found at: https://ww2.arb.ca.gov/laboratory-standard-operating-procedures-ambient-air .

On-site Methods

The gaseous and particulate SNAPS pollutants directly measured in the field can be found in Table B.1. The meteorological parameters for the on-site methods can be found in Table B.2.

TABLE B.1 – On-Site Pollutant Methods

Analyte[1]	Principle of Measurement[2]	Manufacturer	Model
Black carbon	Abs. Spec.	Met One	BC-1054
$PM_{2.5}$	Beta-ray Attenuation	Met One	BAM 1020
H_2S/SO_2	UV Fluorescence	Teledyne	API 101
$CH_4/CO_2/CO$	CRDS	Picarro	2401
O_3	UV Abs. Spec.	Teledyne	API T400
Metals	XRF	Xact	625i
PAMS mixture	GC-FID	Markes-Thermo	Air Server-unity & 1300

1. PAMS = photochemical assessment monitoring station, PM = particulate matter

2. Abs. = absorption, CRDS = cavity ring-down spectroscopy, FID = flame-ionization detection, GC = gas chromatography, MS = mass spectrometry, Spec. = spectroscopy, UV = ultraviolet, XRF = X-ray fluorescence

Table B.2 – On-Site Meteorological Condition Measurements

Variable[1]	Principle of Measurement[2]	Manufacturer	Model
WS	Ultrasonic	RM Young	81000
WD	Ultrasonic	RM Young	81000
Barometric Pressure	Piezo-Resistance	Met One	597
RH - Ambient	CRDS	Picarro	2401
RH - Ambient	Thermistor Resistance	Met One	597
T - Ambient	Pt Resistance	Met One	597
T - Trailer	Thermocouple	Hampshire	T° Sentry Model 140

1. RH = relative humidity, T = temperature, WD = cardinal wind direction, WS = wind speed

2. CRDS = cavity ring-down spectroscopy, Pt = Platinum

Laboratory Methods

Discrete samples will be collected for a wide range of compounds. After field sampling, discrete samples will be transported to a laboratory for analysis. Analytes measured via discrete samples and respective laboratory methods for each compound are listed in Table B.3.

Table B.3 – Discrete Analytes and Laboratory Methods

Analyte[1]	Principle of Measurement[2]	Sampling Media[3]	Analytical Method
Carbonyls	HPLC-UV Abs. Spec.	DNPH cartridge	CARB MLD-022
Glycols [a]	GC-FID	XAD-7 tube	NIOSH 5523
Total Metals	XRF	Teflon™ filters	CARB MLD-034
Cr6+ [a]	Ion Chromatography	Cellulose filters	CARB MLD-039
Mercaptans	GC-Chemiluminescence	Canister or Tedlar bag	ASTM D5504
PAHs/SVOCs	GC-MS	PUF	EPA TO-13A
VOCs	GC-MS	Summa Canister	CARB MLD-058

1. Cr6+ = Hexavalent Chromium, PAH = polycyclic aromatic hydrocarbons, VOC = volatile organic compounds
2. Abs. = absorption, FID = flame-ionization detection, HPLC = high=performance liquid chromatography, GC = gas chromatography, MS = mass spectrometry, Spec. = spectroscopy, UV = ultraviolet, XRF = X-ray fluorescence
3. DNPH = 2,4-Dinitrophenyl Hydrazine, PUF = polyurethane foam, XAD = polymeric resin
a = Measurement of the analyte(s) will be dependent on local emission sources, initial field measurements of other related chemical species, and the availability of suitable sampling/analytical equipment.

Further detail for the SNAPS pollutants and analytical methods can be found in SOPs and technical documents. Please see Table B.4 for the specific SNAPS pollutant SOPs and their relative technical documents.

Table B.4 – SNAPS Pollutant SOPs and Technical Documents

Pollutant	SOP#	Location of SOP documents
On-site measurement		
Ozone	AQSP SOP 002	https://www.arb.ca.gov/airwebmanual/
PM	AQSP SOP 400	
Hydrogen Sulfide	CAMB SOP 360	https://ww2.arb.ca.gov/resources/documents/study-neighborhood-air-near-petroleum-sources-snaps-monitoring-documents
VOCs (auto GC)	CAMB SOP 260	
Carbon Monoxide, Carbon Dioxide, Methane	CAMB SOP 261	
Metals (Auto XRF)	CAMB SOP 450	
Black Carbon	CAMB SOP 250	
Discrete sample		
Toxic Sampler	CAMB SOP 850	https://ww2.arb.ca.gov/resources/documents/study-neighborhood-air-near-petroleum-sources-snaps-monitoring-documents
Carbonyls	MLD 022	https://ww2.arb.ca.gov/laboratory-standard-operating-procedures-ambient-air
Metals – XRF*	MLD 034	
VOCs	MLD 058	
Cr6+	MLD 039	

Contract Laboratory		
Glycols*	NIOSH 5523	https://www.cdc.gov/niosh/docs/2003-154/pdfs/5523.pdf
PAHs	TO-13	https://www3.epa.gov/ttnamti1/files/ambient/airtox/to-13arr.pdf
Sulfur Containing Compounds	ASTM D 5504-12	https://www.astm.org/Standards/D5504.htm

* *Measurement of the analyte(s) will be dependent on local emission sources, initial field measurements of other related chemical species and the availability of suitable sampling/analytical equipment.*

Instrument SOPs contain technical instructions for Program monitoring site operators. In the event of a deviation from the procedures or other issues, appropriate documentation of action will be made. One time procedural changes should be documented in the data record. Permanent or recurring changes should be recorded in an addendum to the SOP, which would then be approved by Program management. Table B.5 is a list of initial equipment and supplies used during the SNAPS Program. Additional information can be found on the SNAPS website.

Table B.5 – SNAPS QA Equipment

Manufacturer	Model	Parameter	Principle of Operation
Alicat	MWB-20SLPM-D	Mass Flow Rate	Differential Pressure
Alicat	MWB-2SLPM-D	Mass Flow Rate	Differential Pressure
Alicat	MWB-500SCCM-D	Mass Flow Rate	Differential Pressure
Alicat	MWB-20SCCM-D	Mass Flow Rate	Differential Pressure
BGI	deltaCal	PM2.5 Sample Flow Rate	Venturi Differential Pressure
BGI	deltaCal	Ambient Temperature	Thermistor Resistance
BGI	deltaCal	Barometric Pressure	Pressure Transducer
Sabio	2010D	Response Calibration	Dilution using Mass Flow Controllers
Teledyne	701H	Response Calibration	Compression/Purification of Ambient Air
Dwyer	475-0 Mark III	Hi-Vol Flow Rate	Differential Pressure

Thermo Andersen	Lo Hi Vol	Hi-Vol Flow Rate	Critical Orifice
Thermo Scientific	GLD Pro	Gas Leak Detector	Electrical Conductivity

Standard Operating Procedures for SNAPS pollutant instruments are available in Table A, on the MLD Air Monitoring Web Manual website at: https://www.arb.ca.gov/airwebmanual/index.php and the SNAPS website.

Mobile Monitoring

The mobile monitoring vehicle is equipped with instrumentation to measure CH_4, CO_2, CO, BTEX, a global positioning system (GPS), and a video camera to record the vehicle's location and surroundings. All real time data are collected using a data logger which synchronizes data from the GPS and instruments into a central file that can be used for data analysis. The mobile monitoring vehicle is also capable of collecting grab samples for more comprehensive analytical analyses as needed. The instruments installed on mobile monitoring vehicle are listed in Table B.6.

Table B.6 – Mobile Vehicle Monitoring Parameters

Parameter	Analyzer	Measurement Method
Methane, Carbon dioxide, Carbon monoxide	Picarro G2401	CRDS
BTEX (Benzene, Toluene, Ethylbenzene, Xylenes)	Tricorn GC-PID	GC-PID
VOCs (Grab samples)	GC-MS	MLD 058

SECTION B3 – SAMPLE HANDLING AND CUSTODY

Gaseous, particulate matter and meteorological parameters may be sampled using either continuous or discrete sampling methods. Continuous sampling instruments test and record sample results in real time and require no additional sample handling or custody forms. Discrete instruments collect samples on various media, which must then be handled and transported to a laboratory for analysis.

B3.1 – Sampling Media Hold Time and Temperature Requirements

General sample media SOPs stipulate specific time frames and environmental conditions for the collection and storage of discrete samples at various stages in the sampling program. If these time frames and conditions are not met, samples may be flagged or invalidated. Our current policy is to analyze any viable sample and allow data users to invalidate as appropriate. In addition to these requirements, operators should practice the usual care to prevent or minimize contamination of the sample media, or anything else which may come in contact with the sample media.
The sample handing conditions of the discrete analytes studied in the SNAPS Program can be found in Table B.7. Refer to applicable SOPs for additional sample handling procedures for each Program pollutant which can be found in Table B.4, Page 30, of this QAPP.

Table B7 – Discrete Analyte Sample Handling Conditions

Analyte	Method Reference	Sample Media	Analytical Technique	Sample Duration	Holding Time
PAH	EPA TO-13A	PUF/XAD	GC/MS	24 hours	7/40 day analysis
Carbonyls	CARB MLD-022	DNPH silica gel tube	HPLC/UV	24 hours	14 days at 4°C, 30 day analysis
VOC	CARB MLD-058 & MLD-066	Canister	GC/MS	Grab or 24 hours	30 days
Sulfurs	CARB ASTM-D5504	Canister	GC – Chemiluminescence	24 hours	5-7 days
Metals	CARB MLD-034	Teflon Filters	XRF	24 hours	Stored at 0-4°C, indefinite
Glycols	NIOSH 5523	XAD-7 tube	GC/FID	0.5 + 2.0 L/min for total max 60L	28 days at 5°C

B3.2 – Chain of Custody Requirements

A chain of custody (COC) must accompany each sample or set of samples. A COC is an accurate written record that tracks possession, transfer, handling, and location of samples from sample media preparation to sample collection, including sample receipt, to reporting. The COC is an important function of sample control and an integral part of sample receipt.

All samples shall be accompanied by a properly completed COC. If not, laboratory staff may not accept samples depending on the program. If samples are accepted, they will be stored appropriately in the specified sample receiving area but may not be processed until a completed COC is received.

Laboratory staff shall sign and date the COC indicating the laboratory has received the sample and is now responsible for sample control and custody. All completed, signed, and dated COCs shall be stored and archived appropriately according to program needs or requirements.

It is expected that any analysis performed by a contract laboratory providing support for the SNAPS Program will be conducted under similar controls as described in the relevant sampling media SOP.

B3.3 – Security

Monitoring Site Security

Monitoring stations are secure sites which are kept locked when CARB personnel are not present. Locked fencing and security cameras are additionally used where possible. The trailers will be equipped with Global Positioning Systems (GPS) to track any unauthorized movement. Only authorized CARB representatives have access to the site keys. Personnel activity at CARB sites are documented in the station logbooks. Computer access and security at the monitoring sites is discussed in detail in Section B8.

Any monitoring site break-in occurrences are logged by the site operator and reported in a timely manner to program management. In addition, California Highway Patrol is notified and requested to complete a report on such an incident.

Laboratory Security

The Monitoring and Laboratory Division is a secure site and access to the laboratory is available via key card for authorized personnel only. Laboratory personnel are required to wear identification at all times. Visitors are required to sign in and out, wear visitor identification, and be accompanied by authorized laboratory personnel. Any variation from this procedure is documented by administrative staff.

MLD site building entrances are monitored with cameras and protected by a security system that alerts police to potential break-ins. Unauthorized access or break-ins are reported to police and all incidences are documented.

Laboratory data is stored on computers and in the Laboratory Information Management System (LIMS). Access to LIMS is managed by the LIMS administrator, and data access privileges are provided based on staff duties and needs. Computer and LIMS access and security is discussed in detail in Laboratory QC Manual at: https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf and in section B8 in this QAPP.

It is expected that any analysis performed by a contract laboratory providing support for the SNAPS Program will be done under similar controls as described in the relevant sampling media SOP.

SECTION B4 – QUALITY CONTROL

Monitoring for criteria pollutants at stationary monitoring sites will be performed in accordance with the criteria described in the applicable gaseous and particulate matter QAPPs, instrument or method SOPs, and the Laboratory QC Manual. The gaseous and PM QAPPs can be found on the CARB website at: https://ww2.arb.ca.gov/our-work/programs/quality-assurance/qm-document-repository/quality-management-plans-and-quality. The Laboratory QC Manual can be found at: https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf. These same criteria will be used as guidelines for determining data quality for criteria pollutants monitored in the SNAPS trailers. Preliminary quality control criteria for non-criteria pollutants will be described in the applicable SOPs, see Section B2, Table B.4, and will be evaluated, and possibly updated, periodically as more experience and data are available.

Quality Control is composed of a set of internal tasks performed routinely that ensures representative, high quality and defensible ambient air quality data. QC tasks address all aspects of monitoring and reporting. Examples include automated and manual calibration checks, flow rate verification, instrument diagnostic data screening, preventative maintenance, data review, and documentation.

For SNAPS instruments, CARB conducts QC checks using a variety of techniques. For gaseous pollutants these may include automated or manual calibration system checks to confirm Program instruments' ability to respond to known concentrations of pollutants. In addition, these QC checks are used to generate control charts to assess instrument drift and verify that instruments are operated within acceptable control limits.

For particulate matter pollutant instruments, flow rate checks are performed periodically to confirm that reliable, accurate flow rates and total flow are obtained. These QC checks should ideally be performed using calibration equipment and standards separate from those used for the multi-point calibration. Flow rate QC checks are not used to make any adjustments to analyzers. Doing so will invalidate the multi-point calibration of

the instrument. In addition, ambient data are not invalidated solely based on automated QC check results. Please see specific SOPs for further details of gaseous and PM pollutants.

The degree of variability in each of these measurements is computed as the precision of those instruments' measurements. Routine QC checks should be performed using calibration equipment and standards separate from those used for the multi-point calibrations whenever possible (refer to section A7 for more details). Station operators, air monitoring management, and data reviewers monitor the results of these checks and will take action if the results fall outside of acceptable limits.

Quality Control Limits

To assess the quality of QC checks, CARB has established QC limits for routine analyses (warning, action and upper/lower limits) based on the results of automated QC checks. See applicable QAPPS and Laboratory QC Manual as mentioned in the beginning of Section B4. CARB has also developed advisory limits for non-routine analyses, which will be evaluated and updated as necessary based on additional experience and data. Please see the links to applicable SOPs, Table B.4 on Page 31.

The goal is to generate data that is comparable to regulatory data, considering the potential challenges of semi-permanent monitoring, when using the same method. All data which is produced by on-site measurements will be reviewed daily. After daily review, any data outliers or abnormal diurnal trends will be investigated and corrective action performed to address any anomalous data. If it is determined that an instrument has malfunctioned or instrument drift has occurred causing the instrument to drift outside of acceptable criteria, corrective actions should be taken to bring the instrument within acceptable control limits. All corrective actions must be documented on QC maintenance sheets, recorded in station log books and in some cases electronically documented in the data management system. This process is discussed further in Section B6.

Performance of the instruments may be further validated or assessed via the performance evaluation program for gaseous and particulate matter pollutants. Details of this program are discussed in the QAPP, Section D1.

Pollutant instruments used in the Program should be maintained within environmentally controlled shelters, as applicable, with the shelter temperature and humidity checked daily. The acceptable range for monitoring shelters is typically between 20°C and 30°C for regulatory programs. However, per manufacturers' specifications, many analyzers have been tested, qualified, and designated to operate at wider temperature ranges. To assess the allowable operating temperature of an instrument a wider range may be used if specified by the manufacturer. Should the operating temperature range of instruments be exceeded, it is important to closely evaluate other instrument diagnostic

parameters. If it is determined that data is valid, but collected when operating temperature limits are exceeded, data should be flagged to indicate the issue. U.S. EPA suggests that shelters be maintained within a standard deviation (SD) of ± 2°C, over a 24 hour period. The SD can be assessed using 1-hour shelter temperature estimates. The program will try to meet these goals, but may not always be able to do so.

A check of instrument diagnostic data, concentration data, QC check values, and error messages will be performed daily or during each site visit. Additional information on these routine service checks can be found in the individual instrument SOPs, listed in QAPP, Section B2 and the monitoring plan for each selected community.
For particulate matter pollutant instruments, flow rate checks may be performed monthly, or more frequently, to confirm that reliable, accurate flow rates and total flow are obtained. Station operators, air monitoring management, and data reviewers monitor the results of these checks and will take action if the results fall outside of acceptable limits.

The response of the thermal desorption GC-FID will be checked using zero air and VOC standards. If the response of the zero air and/or VOC standards do not meet established acceptance criteria for two consecutive days, the instrument will be diagnosed, repaired, and a new calibration will be conducted, as required.

The response of the ozone and hydrogen sulfide gas monitors will be checked using zero air and gas standards on a biweekly schedule. CH4, CO and CO2 instrument responses will be checked monthly. If the zero/span response does not meet established acceptance criteria, corrective actions will be performed and the instrument will be recalibrated.

The sampling flow rate, temperature, and pressure of instruments measuring the mass of atmospheric particles will be checked biweekly. If the measured sampling flow rate does not meet established acceptance criteria, the instrument will be diagnosed and corrected. Following the diagnosis, calibrations will be performed.

On-site particle instruments will have sampling tape checks bi-weekly and the filter tapes will be replaced as needed. The cylinder pressure of helium and nitrogen used for GC instruments will be checked bi-weekly. The water level of the hydrogen generator will also be checked bi-weekly.

While reviewing data against validation criteria, data is expected to be reported as initially measured or invalidated. Adjustments based on QC checks are not intended to correct data previously collected at the monitor, which would be considered post-processing of the data. The implementation of a comprehensive corrective action system is an essential component for maintaining data quality and facilitating

continuous process improvement. Upon review of field calibration or audit results that show air monitoring equipment operating outside Program required control limits appropriate action will be taken and a corrective action process will be employed as needed.

B4.1 – Precision and Bias

A check of instrument diagnostic data and concentration data will be performed during each site visit. Additionally, flow rate QC check information and error messages will be reviewed and addressed. Additional info on these routine service checks can be found in the individual instrument SOPs, listed in QAPP, Section B4.
When method acceptance limits are exceeded, SNAPS Program operators will begin the process of evaluating the situation and developing an appropriate corrective action, including an instrument verification and calibration process. This process is discussed in QAPP, Section B5. Since frequent adjustments to instruments can cause additional uncertainty, certain tolerances have been developed. As long as the instrument is within these tolerances or acceptance criteria, adjustments do not need to be made.

B4.2 – Laboratory QC

The Laboratory Quality Control samples and criteria are discussed in the applicable SOP and Laboratory QC Manual available, respectively, at:
https://ww2.arb.ca.gov/laboratory-standard-operating-procedures-ambient-air and at
https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf .

SECTION B5 – INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Calibration is defined as the comparison of a measurement standard, instrument, or item with a standard or instrument of higher level accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies by adjustment. Calibrations will be conducted with instruments having independent National Institute of Standards and Technology (NIST) traceable standards and adhere to established acceptance criteria.

Prior to implementation of any ambient air monitoring or laboratory activities, in support of the SNAPS Program, SNAPS pollutant monitoring instruments are required to be calibrated against known concentrations of pollutant standards where appropriate. Once an instrument's calibration relationship is established, periodic calibration verifications at reasonable frequencies confirm that the instrument remains in calibration. Performing frequent adjustments to instrumentation can cause additional measurement uncertainty. Calibration tolerances have been developed so that as long as the instruments are within the tolerances, adjustments do not need to be made.

To ensure the quality of the data collected within the SNAPS air monitoring program, all instruments used in the Program must be calibrated:

- During initial installation and at the prescribed frequency outlined in the applicable equipment SOP,
- Following physical relocation,
- Prior to instrument shut-down,
- After any major maintenance or repair,
- After an instrument has drifted outside of acceptable QC limits.

CARB has the responsibility to perform timely certification, calibration, and verification activities for all equipment. The SNAPS Program has the responsibility to utilize these services in order to maintain properly calibrated instruments to generate accurate and defensible data. All necessary calibration methods, applications, and frequencies are outlined within individual instrument SOPs (Table B.4), the Gaseous QAPP, and the PM2.5 QAPP. Both the Gaseous and PM2.5 QAPP can be found at: https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-management-document-repository.

SECTION B6 – INSTRUMENT/EQUIPMENT TESTING, INSPECTION AND MAINTENANCE

CARB uses various types of instruments in support of air monitoring activities, which include both field and laboratory instrumentation. To ensure data collected by SNAPS Program instrumentation is valid, credible and defensible, it is critical to properly test, inspect, and maintain air monitoring instrumentation.

B6.1 – Acceptance Testing and Inspection

CARB has documented processes for acceptance testing, inspection and maintenance of equipment used in its SNAPS Program. Acceptance testing is performed on newly purchased equipment prior to deployment to verify that equipment meets purchase or performance specifications. The testing is performed by trained staff and generally includes a physical inspection, operational checks, performance checks, and configuration for use.

Acceptance criteria for field and continuous instrumentation are defined in acceptance test procedures located on the SNAPS website. Equipment returning from a vendor or following major on-site repair may undergo an abbreviated acceptance test procedure, prior to deployment as appropriate. For laboratory instrumentation, acceptance procedures are described in the Laboratory QC Manual which can be found at this link: https://www.arb.ca.gov/aaqm/sop/nlbqcm.pdf.

B6.2 – Maintenance

Monitoring and analytical equipment used by SNAPS Program are generally designed

to operate without major maintenance or repair for long periods of time. However, routine service checks and preventative maintenance are critical areas of quality control that help to prevent downtime, costly errors, and data loss. Routine service checks are day to day functions which confirm and document that continuous monitors and laboratory instrumentation are properly operating. Preventative maintenance tasks involve routine service checks (which vary from instrument to instrument) and should be performed at the prescribed intervals listed in each instruments appropriate SOP and/or each instruments operating manual. Preventative maintenance tasks should be documented on the appropriate quality control maintenance sheets as established by the SNAPS Program staff. Clear documentation of instrument maintenance is required to confirm instrumentation operation, to aid in troubleshooting, and assist with data validation.

Maintenance procedures specific to SNAPS Program operations are listed in detail in the instrument SOPs referenced in Section B4. Further information can be found in each particular instruments' operation manual. Each instrument has a unique maintenance check sheet for documentation of these activities. These checklists are included on the SNAPS website. A list of initial supplies for the SNAPS Program can be found in Table B.5 in this QAPP and in the Laboratory SOPs at: https://ww2.arb.ca.gov/laboratory-standard-operating-procedures-ambient-air .

For specific maintenance frequency, duration and milestones for SNAPS Program equipment, please see the laboratory specific SOPs listed above.

For preventative maintenance task and frequency please refer to the applicable pollutant SOPs which can be found in QAPP, Section B2, and on the CARB website at https://www.arb.ca.gov/airwebmanual/index.php .

SECTION B7 – INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Procurement of items and services is performed through an agency or state approved vendor, sole source non-competitive bid process, or a competitive bid/contract process as described in CARB's Procurement Services Guide. Item and service requirements are typically based on program or project needs. SNAPS will maintain a max/min supply of frequently used spare parts and consumable materials through our MLD warehouse operations.
Air monitoring supplies and consumables are directed to Program staff for inspection, acceptance, and inventorying. Parts and supplies are inventoried and tracked in a computer database in order to ensure continuous operation of the SNAPS Program.

Acceptance criteria for supplies and consumables are described in the relevant method and acceptance test or operational procedure SOPs. In general, specifications are checked to ensure adequate criteria for supplies and consumables are met and appropriate for use for the operation by the SNAPS Program staff.

MLD maintains a supply of certified gas standards for performance evaluations and

equipment verification. These gas standards are supplied and certified by the vendor in accordance with specified Traceability Protocol for Assay and Certification of Standards. Information, including ID number, Standard composition and concentration, certification expiration date are entered into the appropriate database. This database is maintained by the applicable operational section and available to SNAPS Program staff.

SECTION B8 – DATA MANAGEMENT

Data management describes the overall process for analytical data generation, review, and reporting. Laboratory, field, and management staff are all integral parts of data management. Air quality data measurements made by SNAPS field and laboratory instrumentation are captured by CARB's data acquisition and management systems. At the time of this writing, the data acquisition system is a PC based variation of the CARBLogger system. Data management will be accomplished using the Community Data Management System (CDMS) and the Laboratory Information Management System (LIMS) for automated and laboratory data, respectively. A more in-depth description of these data management systems can be found in the Laboratory QC Manual at: https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf

B8.1 – Data Acquisition

SNAPS obtains information from four different data sources: on-site measurements, MLD laboratory analysis, offsite laboratory analysis, and mobile monitoring.

- On-site measurements include any measurements made with instruments designed to run autonomously. Instruments, except for auto GC, used for on-site measurements will be connected to CARBLogger and sent to the Community Data Management System (CDMS) in Data Management System (DMS) pipe delimited format. For on-site measurements made with auto GC, no direct data ingest will take place by CARBLogger because the identification and quantification of targeted compounds measured by auto GC require confirmation by CARB staff. CARBLogger therefore will be used to automate data export. The follow-up analysis will be conducted by CARB staff to confirm the measurements.
- Offsite laboratory analysis includes the collection of canister or filter samples from monitoring sites and physically shipping the media to laboratories (both MLD operated and contractor operated). In the case of MLD laboratory analyses, an automated mechanism will be implemented to aggregate and transfer data directly from LIMS into CDMS. Pending feedback from the MLD laboratory, results from contractor laboratories may or may not be transmitted in a similar fashion. All laboratory data will be uploaded to CDMS once it is delivered to MLD.
- Mobile monitoring includes special analysis methods and rapid data streams which report parameter values and GPS coordinates in a continuous fashion.

Unlike other systems, this data will be reported by the CODAS system directly to CDMS.

The following datagram, Figure B.1, describes the overall system command and data acquisition system and illustrates the SNAPS data management from one trailer and one mobile monitoring station.

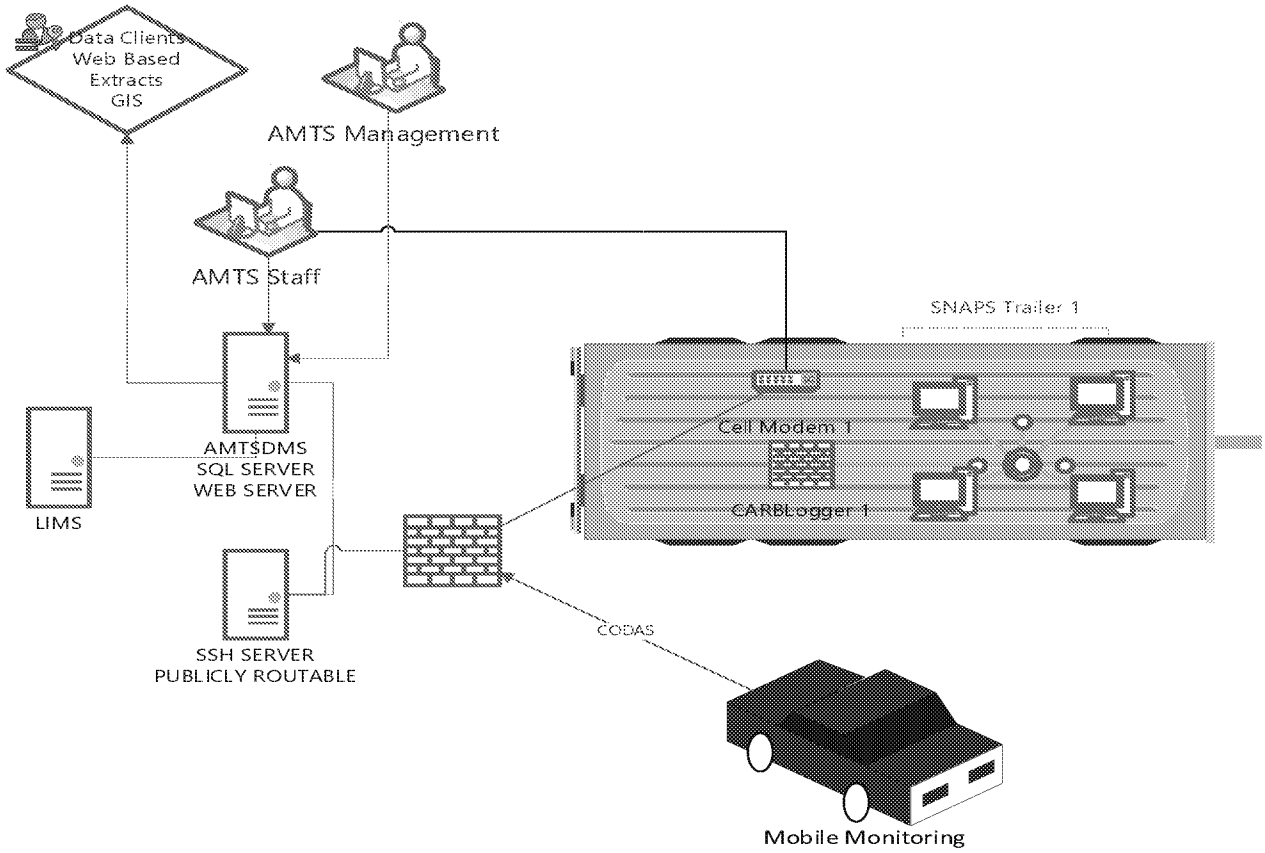

Figure B.1 – SNAPS Data Management

This data management system can be expanded to accommodate the needs to deploy more trailers and platforms if necessary. The SNAPS trailer and mobile platform will each have dedicated cell modem for network connectivity. This network connectivity allows AMTS staff to remotely connect to each platform, administer instrumentation, and for data to be transmitted back to AMTS staff using four primary mechanisms.

1) Unix Secure Copy Protocol (SCP) or Secure File Transfer Protocol (SFTP) will be used to pull data from each trailer (on a public network) into the CARB network for CDMS ingest.

2) Secure Shell(SSH) will allow AMTS staff to remotely connect to CARBLogger Data Acquisition and control/interact with their instrumentation.
3) Emails from GMAIL will be sent to CARB based email addresses for diagnostic alerts, until such time that an SMS gateway is contracted.
4) Data from mobile platforms will be directly streamed to CDMS via CODAS.

Instrument-specific data acquisition mechanisms are detailed in Table B.8. All data produced by on-site continuous measurements are uploaded to the Community Data Management System (CDMS) for review. Deployed GC instrumentation will be remotely programmed and operated using the CARBLogger as a terminal proxy. Chromatograms generated from these runs will be transmitted back to CARB where staff will complete their analysis using vendor specific software (i.e., Chromeleon), the results of which will be stored inside the CDMS system.

Table B.8 – Instrument Specific Data Acquisition Mechanisms

Instrument/Method	Data Acquisition	Timing and Data Acquisition Protocol
API T101 H2S Analyzer	CARBLogger Platform	NTP, Synchronous, ModBUS over Privately Addressed Ethernet
API T400 Ozone Analyzer	CARBLogger Platform	NTP, Synchronous, ModBUS over Privately Addressed Ethernet
Hampshire Indoor Temperature Sensor	CARBLogger Platform	NTP, Synchronous, Serial
Met One BAM 1020 PM2.5	CARBLogger Platform	NTP, Synchronous, Serial
Met One Aethalometer	CARBLogger Platform	NTP, Synchronous, Serial
Picarro G2401	CARBLogger Platform	NTP, Synchronous, file sharing over Privately Addressed Ethernet
RMYoung 81000 Met Sensor	CARBLogger Platform	NTP, Synchronous, Serial
Thermo-Markes auto GC	Chromeleon	NTP, Synchronous, Real Time Streaming to CDMS over Cell Modem
TO13A PAH Analysis	CARB LIMS to CDMS	Asynchronous, Post Analysis Manual Transmission and Entry from MLD laboratory, Direct to CDMS
Metals Analysis (XRF)[a]	CARB LIMS to CDMS	Asynchronous, Post Analysis Manual Transmission and Entry from MLD laboratory, Direct to CDMS

Glycols-NIOSH 5523[a]	CARB LIMS to CDMS	Asynchronous, Post Analysis Manual Transmission and Entry from Contract laboratory, Direct to CDMS

[a] *Measurement of the analyte(s) will be dependent on local emission sources, initial field measurements of other related chemical species and the availability of suitable sampling/analytical equipment.*

B8.2 – Data Management for Discrete Sampling

Data generated by CARB's laboratory from discrete samples is managed by a Laboratory Information Management System (LIMS), which is password protected with controlled access to authorized users only. Data processed by LIMS is stored in a database and managed through front end LIMS software. Other software is utilized along with LIMS to aid in data reporting and electronic data transfer. The database automatically backs up data files onto the server on a weekly basis. In addition, the database is in ARCHIVELOG mode meaning that changes made within the database are archived, rather than overwritten. This ensures that all committed transactions can be recovered in the event of an operating system failure.

LIMS hardware and software are managed in-house by the system administrator. The database includes trace files, which are used to ensure acceptable performance as required. Trace files contain a log produced by the database debugger program. The log includes a record of errors found and corrective action taken. The log runs automatically and sends an email notification to the system administrator when errors occur. In addition, the system administrator manually checks trace files on a weekly basis. The LIMS database information including additional functionality, accessibility and security can be found in its entirety in the Laboratory QC Manual at https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf .

LIMS also facilitates the recording, verification and validation, transmittal, reduction, analysis, management, storage, retrieval, and reporting of analytical data generated by the laboratory. LIMS is maintained by the LIMS administrator.

LIMS administrator creates and/or modifies approved laboratory staff access to LIMS; creates and modifies LIMS methods, data templates and transfers, and data reports; and is able to modify data in LIMS.

All sample and analysis information shall be entered into LIMS or recorded in bound or electronic notebooks. Changes to any data in LIMS must be made by authorized individuals only. Management's approval may be required.

It is expected that any information or data generated by SNAPS Program staff in support of the SNAPS Program will incorporate a similar data review, verification, and validation process with comparable detail and intensity as described in this section and in the SNAPS Monitoring Plan.

B8.3 – Data Security

The following security assurances have been put in place:

- Data Fidelity will be ensured by (where possible) maintaining backup copies of data at various phases in the data collection process. Most data producers will retain data internally. This data will in turn be collected by the data acquisition system, time stamped, and stored in raw text and/or database format. This data is subsequently summarized and emailed to the site operator. After initial automated QC checks have been performed, data is reported to CDMS where it is reviewed by the operator, averaged, interpolated (if needed) and reported to data clients. Any changes made on CDMS are recorded inside the CDMS chain of custody. At any point in time, any of these data steps (Figure B.2) can be retraced to prove data fidelity.

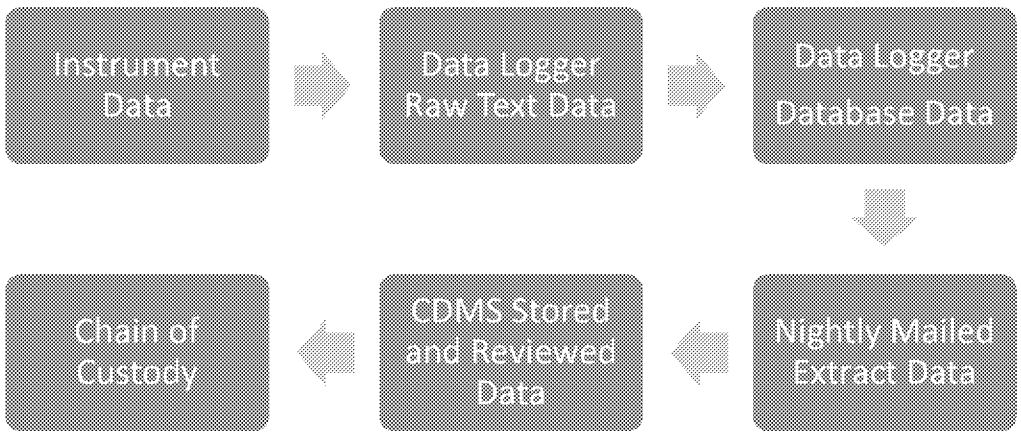

Figure B.2 – Data Review Process

- Data Privacy is safeguarded by requiring account access privileges to access the CDMS system, and the data acquisition systems upstream.
- Data Logger security will follow the due diligence of using a firewall, updating public facing applications, running antivirus, periodic log review, and external inspection by IT security.

SECTION C1 – DATA REVIEW, VERIFICATION AND VALIDATION

The SNAPS program collects real-time pollutant values and discrete samples from areas near petroleum sources. The goal of the SNAPS data collection activities is to collect data of sufficient quantity and quality to meet the goals of the Program. This information is outlined in individual instrument SOPs, the document 'Standard Operating Procedures for Data Review and Validation', Method SOP 610 and the Laboratory QC Manual.

The terms related to data management in this section are defined as:

> Review – in-house examination to ensure that data has been recorded, transmitted, and processed correctly.
> Verification – the process for evaluating completeness, correctness, and conformance/compliance of a specific data set against method, procedural, or contractual specifications.
> Validation – an analyte and sample specific process that extends the evaluation of data beyond the method, procedure, or contractual compliance to determine the quality of a specific data set relative to the end use.

C1.1 – Data Review

The SNAPS monitoring data is reviewed for quality and acceptability based on the analytical method, instrument analysis procedures, quality control requirements, and calibration procedures detailed earlier in this QAPP and in applicable SOPs. The objectives reviewed include data capture (amount of discrete and continuous data reported), precision (the degree of mutual agreement among individual measurements of the same property), bias/accuracy (the degree of agreement between an observed value and an accepted known or reference value), and the amount of precision and bias/accuracy data collected and reported.

Method SOP 610 – Data Review and Validation – may be used as a guidance for the specific steps utilized in the SNAPS Program data review and validation process for continuous data and are located in the Data Acquisition and Quality Control Section of the AirWeb Manual website at: https://www.arb.ca.gov/airwebmanual/. The steps of the method for discrete samples are detailed in the Laboratory QC Manual and individual SOPs located at: https://ww2.arb.ca.gov/laboratory-standard-operating-procedures-ambient-air. In all cases, data validation procedures should be documented. The following is a summary of items a SNAPS monitoring operator should be aware of in order to perform a data review:

- Preliminary data available near real time
- Monthly concentration variations associated with SNAPS pollutants

- Types of instrument malfunctions associated with characteristic data irregularities
- Cyclical or repetitive variations caused by excessive line voltage or temperature variations
- Data patterns indicating a loss of sensitivity, flow issues, or system leaks
- Relationship of one SNAPS pollutant parameter to another

The following data review steps ensure timely identifications of performance issues for field or laboratory activities:

- Frequent review of zero/span/precision and other QC checks indicating performance shifts
- Frequent review of mobile and stationary (discrete and continuous) data
- Frequent review of automated CDMS and CARBLogger emails for indications of alarm conditions
- Daily monitoring and recording of abnormal local events which may impact data quality or completeness
- Review of graphical data displays for recognition of data spikes
- Review of data reporting to ensure completeness criteria are met
- Inspection of sample collection media before and after sampling to identify possible issues of concern
- Comparison of data against historical or expected results

It is expected that any information or data generated by a contract laboratory in support of the SNAPS Program will incorporate a similar data review, verification, and validation process with comparable detail and intensity as described in this section.

C1.2 – Automated Data Quality Control

Automated data quality control is programmed into the overall data transmission process (on the instrument, the data logger, or the CDMS) so that data from faulty instruments are not automatically included into otherwise valid data streams. Operational states of an instrument which result in automatic data flagging, or data qualifiers to be assigned by CARBLogger, CODAS, or alternative data flagging

mechanisms occur when:

1) An instrument has been running outside the manufacturer or CARB specified tolerances. For instance, if the instruments box temperature exceeds the maximum allowable temperature range.
2) An operator has been performing maintenance on the instrument or sampling system, precluding validity of the data being collected. CARBLogger has a menu of flags an onsite operator can choose to apply to data generated at the time of their service call.
3) The instrument or system is in a state of calibration.
4) "Sticking values" commonly caused by instrument malfunction will be automatically flagged invalid.
5) Values above or below the theoretical range of the instrument will be flagged invalid.

Data flagging will not preclude an operator or manager from reviewing and marking data valid at a later time if deemed appropriate. All changes of data flagging states, however, will be recorded into the CDMS data chain of custody for future inspection.

C1.3 – Manual Data Review

Manual data review involves the human review of all data for anomalous behavior that may or may not be reflected by contrary diagnostic parameters. Using tools provided by CDMS, the operator may look for the diurnal patterns of pollutants and wind direction fluctuations to ensure that the instrument appears to be functioning nominally. An example is given in Figure B.3.

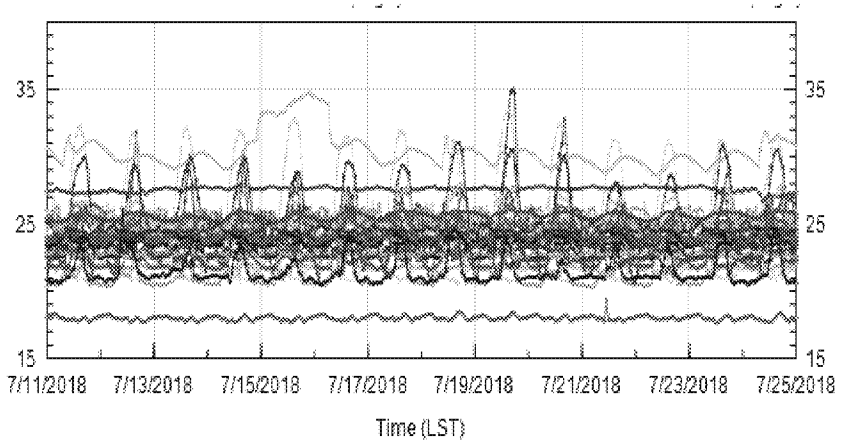

Figure B.3 – Diurnal temperature fluctuations can be quickly assessed to identify areas for improvement. The air conditioning system for the station with the light green trace, for instance, is having AC problems which could be repaired prior to data loss.

The community data management system will allow site operators and supervisors to confirm the overall functioning of the trailer, as well as individual instruments.

Unless otherwise determined by management, all data will receive two levels of technical review by the site operator and site calibrator, and one level of management review prior to data release. Upon final review, the data will be locked and reviewed for data reporting.

SECTION C2 – VERIFICATION AND VALIDATION METHODS

The SNAPS Program has a multi-level data review process which incorporates the concept of review, verification, and validation. A summary of the process, review levels and staff positions typically responsible for the review of the SNAPS pollutant data can be found in the Monitoring Plan. These review levels should be completed, documented, and submitted to the next level of review according to the data reporting schedule.

For a description of the separate review levels followed for continuous data please see Section 13 – Data Analysis and Interpretation, of the Monitoring Plan, on the SNAPS website. For additional information see Section 14.8 – Data Review and Approval, of the Laboratory QC Manual, at: https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf and see SOP 610, Data Review and Validation, on the AirWeb Manual website at: https://www.arb.ca.gov/airwebmanual/ .

C2.1 – Data Issues

During the review process, a first level reviewer will determine whether instrumentation issues will affect data. When problems are identified, troubleshooting and repair will occur in a timely manner and the initial reviewer will inform the second level reviewer to determine if follow up actions are needed (i.e., calibrations, etc.). First level reviewers should view QC data daily, if possible.

If encountering an issue, a second level reviewer will contact the site operator and notify him/her that the QC data indicates a problem exists. They will inquire whether the problem was identified and repaired. Corrective action taken must be documented in the site logbook and maintenance check sheet and also documented in the corrective action on CDMS's Editor's Notes only if data is affected. Second level reviewers should view QC data daily, if possible, and weekly, at a minimum, and follow up by reviewing the Monthly Calibration Control Chart webpage to confirm that the edits were incorporated into CDMS.

There are several tools that may be used to correct the data already submitted as final: a Data Correction Memo, a Corrective Action Notice (CAN) and an Air Quality Data

Action Request (AQDA). CANs and ADQAs are discussed in detail in Section D1 and in the Quality Assurance Manual, Volume 1, Section 9: https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-assurance-manual.

C2.2 – LIMS Verification and Validation

There are separate review levels followed for the laboratory analysis of discrete samples by CARB. The data review and approval process consists of a series of checks to ensure the analytical data generated by the laboratory and transferred to LIMS meets all the method specific QC criteria. The multi-step process includes at a minimum, analyst review, peer review, then management review and approval prior to submittal to clients. All levels of review and approval are initialed and dated on the data package and/or document. Finalized and approved data may be amended in LIMS per management approval. After the request is approved, lab staff and management must follow the data review and approval process. If changes to the finalized data are made, the client must be notified and sent a revised report.

The laboratory data review process is described in the Section 14.8, Data Review and Approval, of the Laboratory QC Manual, which can be found at: https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf.

LIMS has been programmed to automatically verify and validate data entered into the database. Any data outside QC criteria is highlighted for analyst, peer, and management review and comment. QC parameters programmed into LIMS come from federal regulations, QCM, and SOPS. All programming has been tested and verified by the LIMS administrator.

It is expected that any information or data generated by a contract laboratory in support of the SNAPS Program will incorporate a similar data review, verification, and validation process with comparable detail and intensity as described in this section.

SECTION D1 – ASSESSMENT AND RESPONSE ACTIONS

The information in this section, along with the information available on the SNAPS Program website, provides an overview of the SNAPS compliance status with the assessment and response of state and local requirements.

D1.1 – Quality Assessment and Quality Control

CARB's quality assurance program is comprised of quality assessment and quality control activities. Quality assessment is a set of external tasks that are performed outside of normal routine operations to provide certainty that the quality assurance system is generating data of sufficient quantity, quality, and meets or exceeds all

applicable requirements. Quality assessment is independent from the data generation activities. Quality control activities are internal tasks that are performed during sample collection, handling, analysis, and data reporting to ensure data accuracy and precision. For additional CARB Quality Control information please see the Northern Laboratory QC Manual at: https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf .

For the SNAPS Program, AMTS is responsible for quality control which includes instrument calibration and 1 point QC checks and to oversee the program objectives. QAS and QMS perform various quality assessment activities to verify that the data collected comply with procedures and can be considered good quality data and data of appropriate quality for its end use. Quality assessment activities are achieved through various audits and data quality assessments which are independent from the ambient air monitoring program responsibilities and appropriate quantity for the end user.

AMTS Program monitoring staff will review data and take corrective action when the results exceed Program requirements. These processes are explained in further detail in QAPP, section D2.

D1.2 – Monitoring Station Audits

Please see audit SOPs at: https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-assurance-performance-audits.

California's large network and unique ambient air monitoring challenges require a comprehensive state of the art audit program. CARB's audit program meets the applicable requirements. Audits are conducted by using independent NIST traceable standards and adhere to established acceptance criteria.

For CARB's regulatory ambient air monitoring network, QAS is responsible for conducting performance audits of criteria and non-criteria pollutant analyzers, particulate matter samplers, meteorological equipment, and laboratory analyses utilized for generating ambient level measurements. QAS also performs site reviews as well as reports quality assessment and quality control results.

Please see Table D.1 below for the audit acceptance criteria for SNAPS pollutants.

Table D.1 – SNAPS Pollutant Audit Acceptance Criteria (Accuracy)

Instrument/Criteria	Control Limit	Warning
Gaseous Analyzers (Criteria and Non-Criteria, except Ozone)*	± 15%	± 10%
Ozone Analyzers*	± 10%	± 7%
PM2.5 (Filter Based, Continuous)	± 4% of Transfer Standard ± 5% from Design flow rate	None
ATEC Sampler	± 10%	± 7%

* Audit levels 1 and 2 are subject to the following acceptance criteria based on EPA guidance:
  - For O3, and NO2: ± 1.5 ppb difference or ± 15 percent difference, whichever is greater.
  - For CO: ± 0.03 ppm difference or ± 15 percent difference, whichever is greater.

* Annual Performance Evaluations are operational criteria, and exceedances (especially at lower levels) do not automatically invalidate the data.

** Criteria based on data usage

QAS conducts through-the-probe (TTP) audits for continuous gaseous analyzers to meet applicable requirements. TTP audits of the gaseous analyzers, which monitor for criteria pollutants and hydrogen sulfide, are conducted in accordance with Program requirements. These audits verify the accuracy of the gaseous analyzers and ensure the integrity of the entire sampling system. For most TTP audits, an audit van is transported by QAS to the ambient air monitoring station. Audit vans house the necessary instrumentation and equipment to allow the audit to be conducted at the same condition as the station instruments. TTP audits are conducted via the introduction of NIST traceable gases from the van into the station sampling probe inlet at various concentrations. QAS compares the measurement from the station analyzer to the known values generated in the van.

TTP audit methodology can identify deficiencies caused by poor analyzer response, pollutant scavenging contaminants, and sampling system leaks. Deficiencies like these can cause the gaseous analyzers to fail an audit and possibly affect the quality of the ambient air data. An integral part of a performance audit is conducting a siting evaluation. Stations that meet siting criteria at the time of initial setup may no longer conform due to updated regulations or changes in surrounding conditions and land use. Physical measurements and observations are noted on the site survey or accompanying documentation to determine compliance with Program requirements. Many of the siting challenges result from the presence of vegetation or other

obstructions. The height of any obstacles and vegetation above probe height inlets is also determined.

QAS will perform sampler flow audits on continuous PM2.5 samplers for the SNAPS Program. NIST traceable flow measurement instruments will be used to compare the sampler's measured and actual flow rate. Flow audits will be conducted as required by Program needs using independent certified equipment.

QAS will document situations where audit, quality control, or siting goal are not met. Below is a link to the Gaseous QAPP which has the applicable SOPs describing performance and siting audit acceptance criteria and frequencies: https://ww2.arb.ca.gov/our-work/programs/quality-assurance/qm-document-repository/quality-management-plans-and-quality .

The procedures followed by QAS are detailed in the Air Monitoring Quality Assurance Manual, Volume V, entitled, "Audit Procedures for Air Quality Monitoring," at https://www.arb.ca.gov/aaqm/qa/qa-manual/vol5/vol5.htm. The purpose of this documentation is to define the responsibilities for conducting system and performance audits and to provide standardized documented system and performance audit procedures and their respective reporting formats.

D1.3 – Performance Audit Assessment

QAS may conduct similar performance audit assessments for the SNAPS parameters. Specific procedures, frequencies and acceptance criteria would be determined as additional experience and data is available.

D1.4 – Performance Audit Report Summary

Each of CARB's permanent air monitoring stations is audited by QMB. The information provided in the audit contains the map location, latitude and longitude coordinates, site photos, the pollutants monitored, along with a detailed site survey of the instrumentation and physical parameters for each site. Similar information may be available for trailer locations utilized in the SNAPS Program

The results of CARB audits and audit reports are available internally. A similar process for audit information in the SNAPS Program may be available for mobile monitoring trailer locations as well.

It is expected that quality assessment, quality control and performance audit procedures performed by QAS and the SNAPS Program staff will incorporate similar methods and requirements with comparable detail and intensity as described in this section.

D1.5 – Troubleshooting

During a performance audit, if a parameter fails to meet audit acceptance criteria a corrective action request may be issued to the site operator.

For CARB's regulatory monitoring network, an Air Quality Data Action (AQDA) process is utilized. An AQDA is a request for an investigation of the validity of ambient air quality data for a certain period of time. AQDAs are generally issued based upon review of field calibrations or audit results that show air monitoring equipment operating outside required control limits or not meeting appropriate siting conditions. A further description of the AQDA process can be found in Section 9, of the Quality Assurance Manual, at: https://www.arb.ca.gov/aaqm/qa/pqao/repository/qmp_final.pdf.

Other issues identified outside of the audit process, but which may still impact or potentially impact data quality will be documented and the site operator(s) will be informed. The objective of this process is to document, investigate, correct, and reduce the recurrence of air monitoring issues that impact or potentially impact data quality, completeness, storage, or reporting. Additionally, this process improves data quality and ensures compliance with Program requirements.

It is expected that SNAPS Program staff will follow similar guidance in corrective action procedures as described in the Quality Assurance Manual and correction action notice (CAN) SOPs. For a detailed description of the CAN process please see the CAN SOP in Appendix AN, of the Air Monitoring Quality Assurance Manual, Volume V, at: https://www.arb.ca.gov/aaqm/qa/qa-manual/vol5/vol5.htm.

SECTION D2 – REPORTS TO MANAGEMENT

In addition to CARB's oversight responsibilities of the SNAPS program, CARB will prepare periodic reports. CARB will compile a final report for each community, which includes validated data collected within each community. This report may include analysis and interpretation of the data, and may provide attempts to determine sources and/or source categories contributing to the measured pollutant concentrations.

Other reports, such as progress updates (i.e., newsletters, bulletins) may be issued by CARB, and would be tailored to each community's specific needs.

Additionally, CARB will develop a Program Data Quality Report on a bi-monthly basis to provide a summary of the quality of measurement data in quantifiable terms. The program specific report may present an overview of various QA/QC activities, in relation to measurement quality objectives established for the Program. The report may focus primarily on the precision and bias/accuracy of measurements from the monitoring

trailers and the amount of related data collected and reported. A summary of data quality statistics will be available in a final report which is expected to be released approximately six months following the end of each selected site's monitoring cycle.

SECTION D3 – RECONCILIATION WITH USER REQUIREMENTS

The process of evaluating monitoring data against QAPP DQOs is referred to as a data quality assessment (DQA). The DQA process determines how well the validated data can support their intended use.

The DQA process requires a familiarity of the DQOs and sample design goals when reviewing data reports. The information listed in Section D2, Reports to Management, will be used to make this assessment.

It should be noted that either achieving or not achieving measurement DQOs does not equate to certainty that every decision will lead to a correct decision. Rather, either of these scenarios will affect the confidence that a decision maker has with the data and may lead to a reassessment of the DQOs.

CARB is committed to ensuring that air monitoring data collected by SNAPS Program staff is scientifically valid and of sufficient quality and quantity to meet or exceed all applicable requirements. It is the responsibility of Program Management to ensure that CARB's mission and policies as specified in this document are followed. This is accomplished by implementation and management of a Program that emphasizes and promotes continuous quality improvement, utilizes a consistent process of assessing the Program quality system, encouraging recommendations, identifying and implementing improvements to the Program quality system, and promoting ongoing training of all staff, as appropriate. Open and timely communication of quality assurance topics are encouraged at all levels within the SNAPS Program through routine meetings, conference calls, website updates, and other reports. Timely identification and prevention of data errors that potentially affect data quality is achieved through quality control activities prescribed in appropriate quality management documents (QAPPs and SOPs).

APPENDICES

Appendix 1 – Glossary of Terms

Acceptance criteria — Specified limits placed on characteristics of an item, process, or service defined in requirements documents.

Accuracy — A measure of the closeness of an individual measurement or the average of a number of measurements to the true value.

Assessment — The evaluation process used to measure the performance or effectiveness of a system and its elements. As used here, assessment is an all-inclusive term used to denote any of the following: audit, performance evaluation (PE), management systems review (MSR), peer review, inspection, or surveillance.

Audit (Quality) — A systematic and independent examination to determine whether quality activities and related results comply with planned operations and whether these operations are implemented effectively and are suitable to achieve objectives.

Bias — The systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value).

Calibration — A comparison of a measurement standard, instrument, or item with a standard or instrument of higher accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies by adjustments.

Certification — The process of testing and evaluation against specifications designed to document, verify, and recognize the competence of a person, organization, or other entity to perform a function or service, usually for a specified time.

Chain of Custody — An unbroken trail of accountability that ensures the physical security of samples, data, and records.

Completeness — A measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct, normal conditions.

Contractor — Any organization or individual contracting to furnish services or items or to perform work.

Corrective Action — Any measures taken to rectify conditions adverse to quality and, where possible, to preclude their recurrence.

Data of known quality — Data that have the qualitative and quantitative components associated with their derivation documented appropriately for their intended use, and when such documentation is verifiable and defensible.

Data Quality Assessment (DQA) — The scientific and statistical evaluation of data to determine if data obtained from environmental operations are of the right type, quality, and quantity to support their intended use. The five steps of the DQA Process include: 1) reviewing the DQOs and sampling design, 2) conducting a preliminary data review, 3) selecting the statistical test, 4) verifying the assumptions of the statistical test, and 5) drawing conclusions from the data.

Data Quality Indicators — The quantitative statistics and qualitative descriptors that are used to interpret the degree of acceptability or utility of data to the user. The principal data quality indicators are bias, precision, accuracy, comparability, completeness, representativeness.

Data Quality Objectives (DQO) — The qualitative and quantitative statements derived from the DQO Process that clarify a study's technical and quality objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.

Data Quality Objectives (DQO) Process — A systematic strategic planning tool based on the scientific method that identifies and defines the type, quality, and quantity of data needed to satisfy a specified use. The key elements of the DQO process include:

- state the problem,
- identify the decision,
- identify the inputs to the decision,
- define the boundaries of the study,
- develop a decision rule,
- specify tolerable limits on decision errors, and
- optimize the design for obtaining data

DQOs are the qualitative and quantitative outputs from the DQO Process.

Design — The specifications, drawings, design criteria, and performance requirements. Also, the result of deliberate planning, analysis, mathematical manipulations, and design processes.

Distribution — 1) The appointment of an environmental contaminant at a point over time, over an area, or within a volume; 2) a probability function (density function, mass function, or distribution function) used to describe a set of observations (statistical sample) or a population from which the observations are generated.

Document — Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results.

Document control — The policies and procedures used by an organization to ensure that its documents and their revisions are proposed, reviewed, approved for release, inventoried, distributed, archived, stored, and retrieved in accordance with the organization's requirements.

Environmental conditions — The description of a physical medium (e.g., air, water, soil, sediment) or a biological system expressed in terms of its physical, chemical, radiological, or biological characteristics.

Estimate — A characteristic from the sample from which inferences on parameters can be made.

Guidance — A suggested practice that is not mandatory, intended as an aid or example in complying with a standard or requirement.

Guideline — A suggested practice that is not mandatory in programs intended to comply with a standard.

Holding time — The period of time a sample may be stored prior to its required analysis.

Inspection — The examination or measurement of an item or activity to verify conformance to specific requirements.

Laboratory Information Management Systems (LIMS) — A database used to record and store sample information and analytical results as well as perform workflow and data tracking and reporting.

Management System — A structured, nontechnical system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for conducting work and producing items and services.

Method — A body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification), systematically presented in the order in which they are to be executed.

National Institute of Standards and Technology (NIST — An agency of the U.S. Department of Commerce. The Material Measurement Laboratory is a metrology laboratory within NIST that serves as the national reference laboratory for measurements in the chemical, biological, and material sciences. NIST supplies industry, academia, government, and other users with Standard Reference Material (SRM).

Observation — An assessment conclusion that identifies a condition (either positive or negative) that does not represent a significant impact on an item or activity. An observation may identify a condition that has not yet caused a degradation of quality.

Organization — A company, corporation, firm, enterprise, or institution, or part thereof, whether incorporated or not, public or private, that has its own functions and administration.

Organization structure — The responsibilities, authorities, and relationships, arranged in a pattern, through which an organization performs its functions.

Outlier — An extreme observation that is shown to have a low probability of belonging to a specified data population.

Parameter — A quantity, usually unknown, such as a mean or a standard deviation characterizing a population. Commonly misused for "variable," "characteristic," or "property."

Performance Evaluation — A type of audit in which the quantitative data generated in a measurement system are obtained independently and compared with routinely obtained data to evaluate the proficiency of an analyst or laboratory.

Precision — A measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions expressed generally in terms of the standard deviation.

Quality Assessment — The overall system of activities whose purpose is to provide assurance that the quality control activities are done effectively. It involves a continuing evaluation of performance of the production system and the quality of the products produced.

Quality Assurance — An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client. It consists of two separate but related activities, quality control and quality assessment.

Quality Assurance Project Plan (QAPP) — A formal document describing in comprehensive detail the necessary quality assurance (QA), quality control (QC), and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. The QAPP components are divided into four classes: 1) Program Management, 2) Measurement/Data Acquisition, 3) Assessment/Oversight, and 4) Data Validation and Usability. Guidance and requirements on preparation of QAPPs can be found in EPA QA/R-5 and QA/G-5.

Quality Control — The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality. The system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against "out of control" conditions and ensuring the results are of acceptable quality.

Quality Control Sample — An uncontaminated sample matrix spiked with known amounts of analytes from a source independent of the calibration standards. Generally used to establish intralaboratory or analyst-specific precision and bias or to assess the performance of all or a portion of the measurement system.

Quality Management — That aspect of the overall management system of the organization that determines and implements the quality policy. Quality management includes strategic planning, allocation of resources, and other systematic activities (e.g., planning, implementation, and assessment) pertaining to the quality system.

Quality Management Plan (QMP) — A formal document that describes the quality system in terms of the organization's structure, the functional responsibilities of management and staff, the lines of authority, and the required interfaces for those planning, implementing, and assessing all activities conducted.

Quality System — A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products, and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required quality assurance (QA) and quality control (QC).

Reporting Limit — The lowest concentration or amount of the target analyte required to be reported from a data collection project. Reporting limits are generally greater than detection limits and are usually not associated with a probability level.

Representativeness — A measure of the degree to which data accurately and precisely represent a characteristic of a population, a parameter variation at a sampling point, a process condition, or an environmental condition.

Sample Media — Air sampling is done to capture a sample of the contaminants present within the air. The container or substrate used to capture the air sample is the sample media. Membrane filters made of cellulose, glass fiber, quartz fiber, Teflon© or polytetrafluoroethylene (PFTE), etc., sorbent tubes containing charcoal, silica gel, tenax, XAD, etc., and containers such as flasks, canisters (summa polished or silco lined). tedlar bags, etc., are all examples of sample media.

Sensitivity — the capability of a method or instrument to discriminate between measurement responses representing different levels of a variable of interest.

Specification — A document stating requirements and referring to or including drawings or other relevant documents. Specifications should indicate the means and criteria for determining conformance.

Spike — A substance that is added to an environmental sample to increase the concentration of target analytes by known amounts; used to assess measurement accuracy (spike recovery). Spike duplicates are used to assess measurement precision.

Standard – (Calibration or Control Standard) — a substance or material with properties believed to be traceable with sufficient accuracy to permit its use to evaluate the same property of another. It is a solution or substance commonly prepared by the analyst to establish a calibration curve or the analytical response function of an instrument.

Standard deviation — A measure of the dispersion or imprecision of a sample or population distribution expressed as the positive square root of the variance and has the same unit of measurement as the mean.

Standard Operating Procedure (SOP) — A written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps and that is officially approved as the method for performing certain routine or repetitive tasks.

Traceability — The ability to trace the source of uncertainty of a measurement or a measured value through an unbroken chain of comparisons.

Validation —The process by which a sample, measurement method, or a piece of data is deemed useful for a specific purpose.

Sources:

CARB Northern Lab QCM
https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf

CARB QA Manual Volume 5
https://www.arb.ca.gov/aaqm/qa/qa-manual/vol5/v5apxv.pdf?_ga=2.49986466.561973974.1548715571-12075214.1541712919

APPENDIX 2 – CDMS AUTO QC ROUTINE VALUES

The CDMS Auto QC Routine Values are found in the AirNow and DMS tables below.

AirNow Auto QC Criteria

Parameter	Max Suspect	Max Severe	Rate of Change	# of Sticking Hours	Sticking Value (low value)	Fed MDL
O3 (ppb)	130 (110)	150	40 (25)	5	40 (10)	5 ppb
TCO (ppm)	8 (3)	12 (5)	5 (1.5)	15	0	.02 ppm
TSO2 (ppb)	150 (50)	200 (100)	100 (25)	5	5 (0)	.2 ppb
PM25 (ug/m3)	100	200	50	4	10 (0)	2 ug/m3 (3 ug/m3 non-FEM)

*(Red) values in parentheses denote what CARB implemented in DMS which is a deviation from AIRNow QC Criteria.

DMS Auto-QC Criteria

Parameter	Duratio	QC Check	Star t	En d	Valu e	Dat a	QC Code	Description
Ozone	1 Hr	Range (<)	0	23	-5		43- Value below	Flags values < negative MDL
Ozone	1 Hr	Range (>)	0	23	150		9-Invalid	Flags hourly values > Value as invalid
Ozone	1 Hr	Range (>)	0	23	110		5-Suspect	Flags hourly values > Value as suspect
Ozone	1 Hr	Rate of	0	23	25		5-Suspect	Flags hourly value if rate of change is more than 25
Ozone	1 Hr	Sticking	0	23		5	5-Suspect	Flags hourly O3 value if same for 5 consecutive
O3 Box	1 Hr	Range (>)	0	23	39.		32-Shelter Temp	Flags hourly O3 value if box temp more than 39.9

Parameter	Duratio n	QC Check	Star t Hou	End Hou r	Valu e (ppm	Data Point s	QC Code	Description
TCO	1 Hr	Range (<)	0	23	-0.02		43- Value below MDL	Flags values < negative MDL
TCO[5]	1 Hr	Range (>)	0	23	5		9-Invalid	Flags hourly values > Value as invalid
TCO[5]	1 Hr	Range (>)	0	23	3		5-Suspect	Flags hourly values > Value as suspect
TCO [4]	1 Hr	Rate of	0	23	1.5		5-Suspect	Flags hourly value if rate of change is more than 1.5 ppm
TCO	1 Hr	Sticking	0	23		5	9-Invalid	Flags hourly TCO value if same for 5 consecutive hours
TCO	1 min	Sticking	0	23		6	9-Invalid	Flags API300EU auto-ref data invalid

Parameter	Duration	QC Check	Start Hour	End Hour	Value (ppb)	Data Points	QC Code	Description
SO2	1 Hr	Range (<)	0	23	-0.2		43- Value below MDL	Flags values < negative MDL
SO2	1 Hr	Range (>)	0	23	100		9-Invalid	Flags hourly values > Value as invalid
SO2	1 Hr	Range (>)	0	23	50		5-Suspect	Flags hourly values > Value as suspect
SO2	1 Hr	Rate of Change	0	23	25		5-Suspect	Flags hourly value if rate of change is more than 25
SO2	1 Hr	Sticking	0	23		5	5-Suspect	Flags hourly SO2 value if same for 5 consecutive hours

Parameter	Duration	QC Check	Start Hour	End Hour	Value (ug/m3 LC)	Data Points	QC Code	Description
BAM[1]	1 Hr	Range (<)	0	23	-2, -3 or -4		43- Value below MDL	Flags values < negative MDL
BAM[1]	1 Hr	Range (>)	0	23	700		9 - Invalid	Flags hourly values > Value as invalid
BAM[1]	1 Hr	Sticking	0	23	0	4	5 - Suspect	Will flag if hourly value same for 4 consecutive hours
Qtot[2]	1 Hr	Range (<)	0	23	<.697		4 - Suspect Flow	Flags BAM_FEM values if Qtot < .697 m3/min
Qtot[2]	1 Hr	Range (>)	0	23	>.703		40-Sample flow out of limits	Flags BAM_FEM values if Qtot > .703 m3/min
Qtot[2]	1 Hr	Range (<)	0	23	<.600		40-Sample flow out of limits	Flags BAM_FEM values if Qtot < .600 m3/min
Qtot [3]	1 Hr	Range (<)	0	23	<.830		4 - Suspect Flow	Flags BAM values if Qtot < .830 m3/min
Qtot [3]	1 Hr	Range (<)	0	23	0.7		40-Sample flow out of limits	Flags BAM values if Qtot > .700 m3/min
Qtot [3]	1 Hr	Range (>)	0	23	>.837		40-Sample flow out of limits	Flags BAM values if Qtot > .837 m3/min

(1) This includes BAM25, BAM25_a, b,c (collocated BAMs), BAM25_FEM, BAMPMC,
(2) Applies to BAM25 FEM samplers
(3) Applies to Non-FEM BAM25 samplers

REMINDER: When copying QC checks from sites, Verify POC settings within QC Checks.

Source:

AQSB SOP 606
https://www.arb.ca.gov/airwebmanual/aqsbdocs1/AQSB%20SOP%20606%20(Data%20Management%20System).pdf

APPENDIX 3 – CALCULATIONS FOR PRECISION AND BIAS

Calculations for Precision and Bias – Gas/PM QAPP

The materials in this Appendix were adapted from EPA's "Guideline on the Meaning and the Use of Precision and Bias Data Required by 40 CFR, Part 58 to Appendix A".

Data Quality Indicators Calculated for Each Measured Criteria Pollutant

Pollutant	Gaseous Assessments (Precision or Bias)	One-Point Flow Rate Bias Estimate	PM2.5 Bias	Semiannual Flow Rate Audits	Precision Estimate from Collocated Samples
O3	Precision Estimate/ Bias Estimate				
SO2	Precision Estimate/ Bias Estimate				
CO	Precision Estimate/ Bias Estimate				
PM2.5		One-Point Flow Rate	Bias Estimate, including PEP	Semi-Annual Flow Rate	Precision Estimate

Gaseous Criteria Precision and Bias Assessments

Applies to: CO, O3, SO2

40 CFR, Part 58, Appendix A References:

4.1.1 Percent Difference
4.1.2 Precision Estimate
4.1.3 Bias Estimate
4.1.3.1 Assigning a sign (positive / negative) to the bias estimate.
4.1.3.2 Calculate the 25th and 75th percentiles of the percent differences for each site.

Precision and bias estimates are based on 1-point Q/C checks. Then, bias estimates are validated using the annual performance evaluations (audits).

Percent Difference

Equations from this section come from 40 CFR Pt. 58, App. A, Section 4, "Calculations for Data Quality Assessment". For each single point check, calculate the percent difference, di, as follows:

Equation 1

$$d_i = \frac{meas - audit}{audit} \cdot 100$$

where meas is the concentration indicated by the monitoring organization's instrument and audit is the audit concentration of the standard used in the QC check being measured or the audit instrument being used in the Annual Performance Evaluation.

Precision Estimate

The precision estimate is used to assess the one-point QC checks for gaseous pollutants described in section 3.2.1 of CFR Part 58, Appendix A. The precision estimator is the coefficient of variation upper bound and is calculated using Equation 2 as follows:

Equation 2

$$CV\_ub = \sqrt{\frac{n \cdot \sum_{i=1}^{n} d_i^{\,2} - \left(\sum_{i=1}^{n} d_i\right)^2}{2n(n-1)}} \cdot \sqrt{\frac{n-1}{\chi^2_{0.1,n-1}}}$$

where χ2 0.1, n-1 is the 10th percentile of a chi-squared distribution with n-1 degrees of freedom.

Bias Estimate

The bias estimate is calculated using the one point QC checks for SO2, O3, or CO described in CFR, section 3.2.1. The bias estimator is an upper bound on the mean absolute value of the percent differences as described in Equation 3 as follows:

Equation 3

$$|bias| = AB + t_{0.95,n-1} \cdot \frac{AS}{\sqrt{n}}$$

where *n* is the number of single point checks being aggregated; *t0.95,n-1* is the 95th quantile of a t-distribution with n-1 degrees of freedom; the quantity *AB* is the mean of the absolute values of the *di*'s (calculated by Equation 1) and is expressed as Equation 4 as follows:

Equation 4

$$AB = \frac{1}{n} \cdot \sum_{i=1}^{n} |d_i|$$

and the quantity *AS* is the standard deviation of the absolute value of the *di*'s and is calculated using Equation 5 as follows:

Equation 5

$$AS = \sqrt{\frac{n \cdot \sum_{i=1}^{n} |d_i|^2 - \left(\sum_{i=1}^{n} |d_i|\right)^2}{n(n-1)}}$$

Since the bias statistic as calculated in Equation 3 of this Appendix uses absolute values, it does not have a tendency (negative or positive bias) associated with it. A sign will be designated by rank ordering the percent differences (*di*'s) of the QC check samples from a given site for a particular assessment interval. Calculate the 25th and 75th percentiles of the percent differences for each site. The absolute bias upper bound should be flagged as positive if both percentiles are positive and negative if both percentiles are negative. The absolute bias upper bound would not be flagged if the 25th and 75th percentiles are of different signs (i.e., straddling zero).

Precision Estimates from Collocated Samples

Applies to: PM2.5

40 CFR, Part 58, Appendix A References:

- **4.2.1 Precision Estimate from Collocated Samplers**
- **4.3.1 Precision Estimate(PM2.5)**

Precision is estimated for manual instrumentation via duplicate measurements from collocated samplers at a minimum concentration (see table below for minimum concentration levels).

Minimum Concentration Levels for Particulate Matter Precision Assessments

Pollutant	Minimum Concentration Level (in µg/m^3)
PM2.5	3

Precision is aggregated at the monitoring organization level quarterly, annually, and at the 3-year level. For each collocated data pair, the relative percent difference, d_i, is calculated by Equation 6.

Equation 6

$$d_i = \frac{X_i - Y_i}{\left(X_i + Y_i\right)/2} \cdot 100$$

where X_i is the concentration of the primary sampler and Y_i is the concentration value from the audit sampler.

The precision upper bound statistic, CV_{ub}, is a standard deviation on d_i with a 90 percent upper confidence limit (Equation 7).

Equation 7

$$CV\_ub = \sqrt{\frac{n \cdot \sum_{i=1}^{n} d_i^{\,2} - \left(\sum_{i=1}^{n} d_i\right)^2}{2n(n-1)}} \cdot \sqrt{\frac{n-1}{\chi^2_{0.1,n-1}}}$$

where, n is the number of valid data pairs being aggregated, and $\chi^2_{0.1,n-1}$ is the 10th

percentile of a chi-squared distribution with n-1 degrees of freedom. The factor of 2 in the denominator adjusts for the fact that each d_i is calculated from two values with error.

PM2.5 Bias Assessment

Applies to: PM2.5

40 CFR Part 58 Appendix A Reference:

- **4.3.2 Bias Estimate ($PM_{2.5}$)**

The bias estimate is calculated using the Performance Evaluation Program (PEP) audits described in CFR, section 4.1.3 of Part 58, Appendix A. The bias estimator is based on upper and lower probability limits on the mean percent differences. The mean percent difference, *D*, is calculated by Equation 8 below.

Equation 8

$$D = \frac{1}{n_j} \cdot \sum_{i=1}^{n_j} d_i$$

Confidence intervals can be constructed for these average bias estimates in Equation 9 of this document using equations 9 and 10 below:

Equation 9

$$\text{Upper 90\% Confidence Interval} = D + t_{0.95,df} \cdot \frac{s_d}{\sqrt{n_j}}$$

Equation 10

$$\text{Lower 90\% Confidence Interval} = D - t_{0.95,df} \cdot \frac{s_d}{\sqrt{n_j}}$$

Where, $t_{0.95,df}$ is the 95th quantile of a t-distribution with degrees of freedom $df=n_j-1$ and s_d is an estimate of the variability of the average bias and is calculated using Equation 11 below:

Equation 11

$$s_d = \sqrt{\frac{\sum_{i=1}^{n_j} (d_i - D)^2}{n_j - 1}}$$

Flow Rate Audits (Semi-Annual)

Applies to: PM2.5, PM10-2.5

40 CFR Part 58 Appendix A References:

- **4.2.3 Assessment Semi-Annual Flow Rate Audits**
- **4.2.4 Percent Differences**

The flow rate audits are used to assess the results obtained from the one-point flow rate verifications and to provide an estimate of flow rate acceptability. For each flow rate audit, calculate the percent difference in volume using Equation 12 of this Appendix where meas is the value indicated by the sampler's volume measurement and audit is the actual volume indicated by the auditing flow meter.

Equation 12

$$d_i = \frac{meas - audit}{audit} \cdot 100$$

To quantify this annually at the site level and at the 3-year primary quality assurance organization level, probability limits are calculated from the percent differences using equations 13 and 14 of this document where m is the mean and k is the total number of one-point flow rate verifications for the year

Equation 13

$$\text{Upper Probability Limit} = m + 1.96 \cdot S$$

Equation 14

$$\text{Lower Probability Limit} = m - 1.96 \cdot S$$

where, m is the mean (equation 15):

Equation 15

$$m = \frac{1}{k} \cdot \sum_{i=1}^{k} d_i$$

where, k is the total number of one point QC checks for the interval being evaluated and S is the standard deviation of the percent differences (Equation 16) as follows:

Equation 16

$$S = \sqrt{\frac{k \cdot \sum_{i=1}^{k} d_i^2 - \left(\sum_{i=1}^{k} d_i\right)^2}{k(k-1)}}$$

References for Bias

(2) EPA Requirements for Quality Management Plans. EPA QA/R-2. EPA/240/B-01/002. March 2001, Reissue May 2006. Office of Environmental Information, Washington, DC 20460. *http://www.epa.gov/quality/agency-wide-quality-system-documents* .

(3) EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations. EPA QA/R-5. EPA/240/B-01/003. March 2001, Reissue May 2006. Office of Environmental Information, Washington, DC 20460. *http://www.epa.gov/quality/agency-wide-quality-system-documents* .

(4) EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards. EPA-600/R-12/531. May, 2012. Available from U.S. Environmental Protection Agency, National Risk Management Research Laboratory, Research Triangle Park NC 27711. *http://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=245292* .

(5) Guidance for the Data Quality Objectives Process. EPA QA/G-4. EPA/240/B-06/001. February, 2006. Office of Environmental Information, Washington, DC 20460. *http://www.epa.gov/quality/agency-wide-quality-system-documents* .

(6) List of Designated Reference and Equivalent Methods. Available from U.S. Environmental Protection Agency, National Exposure Research Laboratory, Human Exposure and Atmospheric Sciences Division, MD-D205-03, Research Triangle Park, NC 27711. *http://www3.epa.gov/ttn/amtic/criteria.html* .

(7) Transfer Standards for the Calibration of Ambient Air Monitoring Analyzers for Ozone. EPA-454/B-13-004 U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, October, 2013. *http://www3.epa.gov/ttn/amtic/qapollutant.html* .

(8) Paur, R.J. and F.F. McElroy. Technical Assistance Document for the Calibration of Ambient Ozone Monitors. EPA-600/4-79-057. U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, September, 1979. http://www.epa.gov/ttn/amtic/cpreldoc.html .

(9) Quality Assurance Handbook for Air Pollution Measurement Systems, Volume 1—A Field Guide to Environmental Quality Assurance. EPA-600/R-94/038a. April 1994. Available from U.S. Environmental Protection Agency, ORD Publications Office, Center for Environmental Research Information (CERI), 26 W. Martin Luther King Drive, Cincinnati, OH 45268. http://www3.epa.gov/ttn/amtic/qalist.html .

(10) Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Ambient Air Quality Monitoring Program Quality System Development. EPA-454/B-13-003. http://www3.epa.gov/ttn/amtic/qalist.html .

(11) National Performance Evaluation Program Standard Operating Procedures. http://www3.epa.gov/ttn/amtic/npapsop.html .

e-CFR, Title 40, Part 58, Appendix A

Appendix 4 – Target Analyte List

This is a list of possible Target Analytes selected for monitoring in the SNAPS Program and the applicable measurement method. Measurements of samples may be discrete, on-site or both.

	Discrete Samples							On-site Measurements					
Compound Name	MLD058	TO-13 SIM mode	TO-13 Scan mode	XRF	NIOSH 5523	MLD022	ASTM D5504	PAMS	Beta-ray Attenuation	Light Absorption	CRDS	UV Fluorescence	UV Absorption
Benzene	x							x					
Ethylbenzene	x							x					
Styrene	x							x					
Toluene	x							x					
Xylene (o)	x							x					
Xylenes (m & p)	x							x					
1,1,1-Trichloroethane	x												
1,3-Butadiene	x												
Acetone	x												
Acetonitrile	x												
Acrolein	x												
Acrylonitrile	x												
Bromomethane	x												
Carbon tetrachloride	x												
Chloroform	x												
cis-1,3-Dichloropropene	x												
Dichloromethane	x												
Ethanol	x												
Freon 11	x												
Freon 113	x												
Freon 12	x												
Perchloroethylene	x												
trans-1,3-Dichloropropene	x												
Trichloroethylene	x												
Vinyl chloride	x												
2-Methylnaphthalene		x	x										
Acenaphthene		x	x										
Acenaphthylene		x	x										

Compound Name	Discrete Samples							On-site Measurements					
	MLD058	TO-13 SIM mode	TO-13 Scan mode	XRF	NIOSH 5523	MLD022	ASTM D5504	PAMS	Beta-ray Attenuation	Light Absorption	CRDS	UV Fluorescence	UV Absorption
Anthracene		x	x										
Benzo[a]anthracene		x	x										
Benzo[a]pyrene		x	x										
Benzo[b]fluoranthene		x	x										
Benzo[g.h,i]perylene		x	x										
Benzo[k]fluoranthene		x	x										
Chrysene		x	x										
Dibenz[a,h]anthracene		x	x										
Fluoranthene		x	x										
Fluorene		x	x										
Indeno[1,2,3-cd]pyrene		x	x										
Naphthalene		x	x										
Phenanthrene		x	x										
Pyrene		x	x										
1, 3-Dichlorobenzene			x										
1,2,4-Trichlorobenzene			x										
1,2-Dichlorobenzene			x										
1,4-Dichlorobenzene			x										
2,4,5-Trichlorophenol			x										
2,4,6-Tribromophenol			x										
2,4,6-Trichlorophenol			x										
2,4-Dichlorophenol			x										
2,4-Dimethylphenol			x										
2,4-Dinitrophenol			x										
2,4-Dinitrotoluene			x										
2,6-Dinitrotoluene			x										
2-Chloronaphthalene			x										
2-Chlorophenol			x										
2-Fluorobiphenyl (Surr)			x										
2-Fluorophenol			x										
2-Methylphenol			x										
2-Nitroaniline			x										
2-Nitrophenol			x										

Compound Name	Discrete Samples							On-site Measurements					
	MLD058	TO-13 SIM mode	TO-13 Scan mode	XRF	NIOSH 5523	MLD022	ASTM D5504	PAMS	Beta-ray Attenuation	Light Absorption	CRDS	UV Fluorescence	UV Absorption
3 & 4 Methylphenol			x										
3,3'-Dichlorobenzidine			x										
3-Nitroaniline			x										
4,6-Dinitro-2-methylphenol			x										
4-Bromophenyl phenyl ether			x										
4-Chloro-3-methylphenol			x										
4-Chloroaniline			x										
4-Chlorophenyl phenyl ether			x										
4-Nitroaniline			x										
4-Nitrophenol			x										
Benzoic acid			x										
Benzyl alcohol			x										
Bis (2-chloroisopropyl) ether			x										
Bis(2-chloroethyl)ether			x										
Bis(2-ethylhexyl) phthalate			x										
Bis(2-chloroethoxy)methane			x										
Butyl benzyl phthalate			x										
Dibenzofuran			x										
Diethyl phthalate			x										
Dimethyl phthalate			x										
Di-n-butyl phthalate			x										
Di-n-octyl phthalate			x										
Hexachloro-1,3-cyclopentadiene			x										
Hexachlorobenzene			x										
Hexachlorobutadiene			x										
Hexachloroethane			x										
Isophorone			x										
Nitrobenzene			x										
N-Nitrosodimethylamine			x										
N-Nitrosodi-n-propylamine			x										
N-Nitrosodiphenylamine			x										
Pentachlorophenol			x										
Phenol			x										

Compound Name	Discrete Samples							On-site Measurements					
	MLD058	TO-13 SIM mode	TO-13 Scan mode	XRF	NIOSH 5523	MLD022	ASTM D5504	PAMS	Beta-ray Attenuation	Light Absorption	CRDS	UV Fluorescence	UV Absorption
Aluminum				x									
Antimony Compounds				x									
Arsenic				x									
Barium				x									
Bromine				x									
Calcium				x									
Chlorine				x									
Chromium				x									
Cobalt				x									
Copper				x									
Iron				x									
Lead				x									
Manganese				x									
Mercury				x									
Molybdenum				x									
Nickel				x									
Phosphorus				x									
Potassium				x									
Rubidium				x									
Selenium				x									
Silicon				x									
Strontium				x									
Sulfur				x									
Tin				x									
Titanium				x									
Vanadium				x									
Yttrium				x									
Zinc				x									
1,3-Butylene glycol					x								
Diethylene glycol					x								
Ethylene glycol (or 1,2-ethanediol)					x								
Propylene glycol					x								
Tetraethylene glycol					x								

Compound Name	Discrete Samples							On-site Measurements					
	MLD058	TO-13 SIM mode	TO-13 Scan mode	XRF	NIOSH 5523	MLD022	ASTM D5504	PAMS	Beta-ray Attenuation	Light Absorption	CRDS	UV Fluorescence	UV Absorption
Triethylene glycol					x								
Acetaldehyde						x							
Formaldehyde						x							
Methyl Ethyl Ketone, MEK (or 2-Butanone)						x							
Hydrogen Sulfide							x					x	
2,5-Dimethylthiophene							x						
2-Ethylthiophene							x						
3-Methylthiophene							x						
Carbon Disulfide							x						
Carbonyl Sulfide							x						
Diethyl Disulfide							x						
Diethyl Sulfide							x						
Dimethyl Disulfide							x						
Dimethyl Sulfide							x						
Ethyl Methyl Sulfide							x						
Ethyl Mercaptan							x						
Isobutyl Mercaptan							x						
Isopropyl Mercaptan							x						
Methyl Mercaptan							x						
n-Butyl Mercaptan							x						
n-Propyl Mercaptan							x						
tert-Butyl Mercaptan							x						
Tetrahydrothiophene							x						
Thiophene							x						
PM2.5									x				
Black Carbon										x			
Carbon dioxide											x		
Carbon monoxide											x		
Methane											x		
Ozone													x
1,2,3-trimethylbenzene								x					
1,2,4-trimethylbenzene								x					

Compound Name	Discrete Samples							On-site Measurements					
	MLD058	TO-13 SIM mode	TO-13 Scan mode	XRF	NIOSH 5523	MLD022	ASTM D5504	PAMS	Beta-ray Attenuation	Light Absorption	CRDS	UV Fluorescence	UV Absorption
1,3,5-Trimethylbenzene								x					
1-Butene								x					
1-Hexene								x					
1-Pentene								x					
2,2,4-trimethylpentane								x					
2,2-dimethylbutane								x					
2,3,4-trimethylpentane								x					
2,3-dimethylbutane								x					
2,3-dimethylpentane								x					
2,4-dimethylpentane								x					
2-Ethyltoluene (or o-Ethyltoluene)								x					
2-methylheptane								x					
2-methylhexane								x					
2-methylpentane (isohexane)								x					
3-Ethyltoluene (or m-Ethyltoluene)								x					
3-methylheptane								x					
3-methylhexane								x					
3-methylpentane								x					
4-Ethyltoluene (or p-Ethyltoluene)								x					
Acetylene (or ethyne)								x					
Butane (or n-Butane)								x					
Cis-2-butene								x					
cis-2-pentene								x					
Cumene (or Isopropylbenzene)								x					
Cyclohexane								x					
Cyclopentane								x					
Decane (n-Decane)								x					
Diethylbenzene - M (m-Diethylbenzene)								x					
Diethylbenzene - P (p-Diethylbenzene)								x					
Dodecane (or n-Dodecane)								x					
Ethane								x					

Compound Name	Discrete Samples							On-site Measurements					
	MLD058	TO-13 SIM mode	TO-13 Scan mode	XRF	NIOSH 5523	MLD022	ASTM D5504	PAMS	Beta-ray Attenuation	Light Absorption	CRDS	UV Fluorescence	UV Absorption
Ethylene (or Ethene)								x					
Heptane (or n-Heptane)								x					
Hexane (or n-Hexane)								x					
Isobutane (or 2-Methylpropane)								x					
Isopentane (or 2-Methylbutane)								x					
Isoprene (or 2-methyl-1,3-butadiene)								x					
Methylcyclohexane								x					
Methylcyclopentane								x					
Nonane (or n-Nonane)								x					
Octane (or n-Octane)								x					
Pentane (or n-Pentane)								x					
Propane								x					
Propylbenzene								x					
Propylene (or Propene)								x					
Trans-2-butene								x					
Trans-2-pentene								x					
Undecane (or n-Undecane)								x					

Appendix 5 – PAH Summary of Information

Table 1 - US EPA Priority PAHs

PAH	Ring Size	CAS number	PAH	Ring Size	CAS number
Naphthalene	2	91-20-3	Chrysene	4	218-01-9
Acenaphthene	3	83-32-9	Pyrene	4	129-00-0
Acenaphthylene	3	208-96-8	Benzo(a)pyrene	5	50-32-8
Anthracene	3	120-12-7	Benzo(b)fluoranthene	5	205-99-2
Phenanthrene	3	85-01-8	Benzo(k)fluoranthene	5	207-08-9
Fluorene	3	86-73-7	Dibenz(a,h)anthracene	6	53-70-3
Fluoranthene	4	206-44-0	Benzo(g,h,i)perylene	6	191-24-2
Benzo(a)anthracene	4	56-55-3	Indeno[1,2,3-cd]pyrene	6	193-39-5

Table 2 - PAHs with OEHHA values (not on our list of target test analytes for community monitoring.)

PAH	CAS number	Highest Detected Conc. (ng/m^3)	OEHHA Cancer Unit Risk (ug/m^3)	Can be tested	Method
Benzo(j)fluoranthene *#	205-82-3	0.19*	$1.1E^{-4}$	N	-
7,12-Dimethylbenz(a)anthracene *#	57-97-6	0.30*	$7.1E^{-2}$	Y	TO-13 Full Scan
3-Methylcholanthrene *	56-49-5	0.014*	$6.3E^{-3}$	Y	TO-13 Full Scan
5-Methylchrysene &	3697-24-3	-	$1.1E^{-3}$	N	-
5-Nitroacenaphthene	602-87-9	-	$3.7E^{-5}$	N	-
2-Nitrofluorene	607-57-8	-	$1.1E^{-5}$	N	-
Dibenz(a,h)acridine	226-36-8	-	$1.1E^{-4}$	N	-
Dibenz(a,j)acridine	224-42-0	-	$1.1E^{-4}$	N	-
Dibenzo(a,e)pyrene #	192-65-4	0.0019#	$1.1E^{-3}$	Y	TO-13A Method Devolvement
Dibenzo(a,h)pyrene *	189-64-0	0.018*	$1.1E^{-2}$	Y	TO-13A Method Devolvement
Dibenzo(a,i)pyrene *#	189-55-9	0.019*	$1.1E^{-2}$	Y	TO-13A Method Devolvement
Dibenzo(a,l)pyrene *#	191-30-0	0.022*	$1.1E^{-2}$	Y	TO-13A Method Devolvement
7H-Dibenzo(c,g)carbazole	194-59-2	-	$1.1E^{-3}$	N	-
1,6-Dintiropyrene	42397-64-8	-	$1.1E^{-2}$	N	-
1,8-Dinitropyrene	42397-65-9	-	$1.1E^{-3}$	N	-
6-Nitrochrysene	7496-02-0	-	$1.1E^{-2}$	N	-
1-Nitropyrene	5522-43-0	-	$1.1E^{-4}$	N	-
4-Nitropyrene	57835-92-4	-	$1.1E^{-4}$	N	-

Table 3 - Suggested PAHs to test (fund dependent)

PAH	CAS number	Highest Detected Conc. (ng/m^3)	OEHHA Cancer Unit Risk (ug/m^3)	Can be tested	Method
7,12-Dimethylbenz(a)anthracene *#	57-97-6	0.30*	$7.1E^{-2}$	Y	TO-13 Full Scan
3-Methylcholanthrene *	56-49-5	0.014*	$6.3E^{-3}$	Y	TO-13 Full Scan
Dibenzo(a,e)pyrene #	192-65-4	0.0019#	$1.1E^{-3}$	Y	TO-13A Method Devolvement
Dibenzo(a,h)pyrene *	189-64-0	0.018*	$1.1E^{-2}$	Y	TO-13A Method Devolvement
Dibenzo(a,i)pyrene *#	189-55-9	0.019*	$1.1E^{-2}$	Y	TO-13A Method Devolvement
Dibenzo(a,l)pyrene *#	191-30-0	0.022*	$1.1E^{-2}$	Y	TO-13A Method Devolvement

APPENDIX 6 – References for Routine QC Checks of SNAPS DQOs

REFERENCE LIST		
POLLUTANT	**REFERENCE SOURCE**	**WEBSITE LINK**
Black Carbon	CARB AQSB SOP 400 – Met One Instruments Beta Attenuation Mass Monitor (BAM – 1020)	https://ww2.arb.ca.gov/resources/documents/standard-operating-procedures-ambient-air-monitoring
$CH_4/CO/CO_2$	CARB CAMB SOP – Picarro G2401 Analyzer for CO2/CO/CO4	https://ww2.arb.ca.gov/sites/default/files/2018-12/SOP261%20for%20PICARRO%202401%20%20CO-CO2-CH4.pdf
Carbonyls	CARB AQSB SOP 801 – Xontech Model 924 Sampler	https://ww2.arb.ca.gov/resources/documents/standard-operating-procedures-ambient-air-monitoring
Glycols	CARB AQSB SOP 801 – Xontech Model 924 Sampler	https://ww2.arb.ca.gov/resources/documents/standard-operating-procedures-ambient-air-monitoring
H2S	EPA QA Handbook	https://www3.epa.gov/ttn/amtic/qalist.html
Metals	CARB AQSB SOP 801 – Xontech Model 924 Sampler	https://ww2.arb.ca.gov/resources/documents/standard-operating-procedures-ambient-air-monitoring
Ozone	EPA QA Handbook	https://www3.epa.gov/ttn/amtic/qalist.html
PAHs	EPA TO-13A – Determination of Polycyclic Aromatic Hydrocarbons in Ambient Air using GC/MS	https://www3.epa.gov/ttnamti1/files/ambient/airtox/to-13arr.pdf
PM2.5	CARB MLD 055 – SOP for Determination of PM2.5 and PM Coarse Mass by Gravimetric Analysis	https://www.arb.ca.gov/aaqm/sop/mld055.pdf
VOCs (sulfur containing compounds)	CARB SOP MLD 058 – Determination of Halogenated Compounds in Ambient Air by GC/MS	https://www.arb.ca.gov/aaqm/sop/mld058.pdf
VOCs (PAMS mixture)	CARB SOP MLD 066 – Determination of Oxygenates and Nitriles in Ambient Air by GC/MS	https://www.arb.ca.gov/aaqm/sop/mld066.pdf

APPENDIX 7 – REFERENCES

CARB REFEENCES	
Title	**Website Link**
Air Web Manual	https://www.arb.ca.gov/airwebmanual/vol2.php
-Data Review and Validation	https://www.arb.ca.gov/airwebmanual/index.php
-Instrument Manuals and SOPs (Vol 2-AQSB, Vol 3-NLB, Vol 4-QMB)	https://www.arb.ca.gov/airwebmanual/instrument_manuals/index.php
-Ozone SOP and Technical Documents	https://www.arb.ca.gov/airwebmanual/amwmn.php?c=0
Laboratory Equipment SOPs	https://www.arb.ca.gov/aaqm/sop/nlbqcm.pdf
Laboratory QC Manual	https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf
Laboratory SOPs	https://ww2.arb.ca.gov/laboratory-standard-operating-procedures-ambient-air
Quality Assurance Manual	https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-assurance-manual
Quality Assurance Manual – Volume I	https://www.arb.ca.gov/aaqm/qa/pqao/repository/qmp_final.pdf
Quality Assurance Manual – Air Monitoring Audit Procedures	https://www.arb.ca.gov/aaqm/qa/qa-manual/vol5/vol5.htm
QA Performance Audits	https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-assurance-performance-audits
QM Document Repository	https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-management-document-repository
QM Document Repository – QMP and QAPP	https://ww2.arb.ca.gov/our-work/programs/quality-assurance/qm-document-repository/quality-management-plans-and-quality
SNAPS LIST SERVE	https://www.arb.ca.gov/cc/oil-gas/snaps/snaps.htm#ListServe
SNAPS Program Main Page	https://ww2.arb.ca.gov/our-work/programs/study-neighborhood-air-near-petroleum-sources
State and Federal Ambient Air Quality Standards Table	https://www.arb.ca.gov/research/aaqs/aaqs2.pdf

OTHER REFERENCES	
Title	**Website**
Code Of Federal Regulation, (Appendix E of Title 40, Part 58)	https://www.ecfr.gov/cgi-bin/text-idx?SID=3df9fefa50d07e9173fd9f354eb41328&mc=true&node=pt40.6.58&rgn=div5
U.S. Environmental Protection Agency QA/G-4, Guidance for the Data Quality Objectives Process, U.S. EPA, 1994	https://www.epa.gov/fedfac/guidance-systematic-planning-using-data-quality-objectives-process
U.S. Environmental Protection Agency QAPP Guidance, Guidance for Quality Assurance Project Plans, U.S. EPA QA/G-5, December 2002	https://www.epa.gov/quality/guidance-quality-assurance-project-plans-epa-qag-5
U.S. Environmental Protection Agency, Section 3 - Quality Assurance Handbook for Air Pollution Measurement Systems, U.S. Environmental Protection Agency, 2011	https://www3.epa.gov/ttn/amtic/qalist.html

APPENDIX 8 – WEBSITE LINKS IN SNAPS QAPP

CARB AirWeb Manual: https://www.arb.ca.gov/airwebmanual/vol2.php

CARB AirWeb Manual – Ambient Air Monitoring Instrument Manuals:
https://www.arb.ca.gov/airwebmanual/instrument_manuals/index.php

CARB AirWeb Manual Technical Documents – Ozone SOPs:
https://www.arb.ca.gov/airwebmanual/amwmn.php?c=0

CARB AirWeb Manual MLD Instrument SOPs - Data review and validation:
https://www.arb.ca.gov/airwebmanual/index.php

CARB Document Repository:
https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-management-document-repository

CARB Quality Assurance Manual Main Page:
https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-assurance-manual

CARB Quality Assurance Manual, Volume I – Quality Management Plan:
https://www.arb.ca.gov/aaqm/qa/pqao/repository/qmp_final.pdf

Quality Assurance Manual, Volume 1, Section 9 – Performance Audits
https://ww2.arb.ca.gov/our-work/programs/quality-assurance/quality-assurance-performance-audits

CARB Quality Assurance Manual, Volume V, Audit Procedures for Air Quality Monitoring:
https://www.arb.ca.gov/aaqm/qa/qa-manual/vol5/vol5.htm

CARB Quality Management Plans and Quality Assurance Project Plans: Gaseous and PM QAPP
https://ww2.arb.ca.gov/our-work/programs/quality-assurance/qm-document-repository/quality-management-plans-and-quality

CARB Laboratory SOP: https://ww2.arb.ca.gov/laboratory-standard-operating-procedures-ambient-air

CARB Laboratory Quality Control Manual: https://ww2.arb.ca.gov/sites/default/files/2018-10/nlbqcm.pdf

CARB SNAPS ListServe - https://public.govdelivery.com/accounts/CARB/subscriber/new?topic_id=oil-gas

CARB SNAPS Program Main Page - https://ww2.arb.ca.gov/our-work/programs/study-neighborhood-air-near-petroleum-sources

California State and Federal Ambient Air Quality Standards Table and footnotes, Section A5.1, Page 17 - https://www.arb.ca.gov/research/aaqs/aaqs2.pdf

Code of Federal Regulations, Appendix E of Title 40, Part 58 of the CFR. - Siting Requirements Page 19: https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=0f3bfa16342b3e5b858743bbbbdcfa4f&r=PART&n=40y6.0.1.1.6

U.S. EPA, 2011, Section 3 of the Quality Assurance Handbook for Air Pollution Measurement Systems: https://www3.epa.gov/ttn/amtic/qalist.html

U.S. EPA QA/G-4, Guidance for the Data Quality Objectives Process (U.S. EPA, 1994 - https://www.epa.gov/fedfac/guidance-systematic-planning-using-data-quality-objectives-process

U.S. EPA QAPP Guidance for Quality Assurance Project Plans, U.S. EPA QA/G-5, December 2002: https://www.epa.gov/quality/guidance-quality-assurance-project-plans-epa-qag-5

APPENDIX E.
STATEWIDE AIR MONITORING PLAN

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I. INTRODUCTION

Community air monitoring plays an important role in supporting effective action to reduce emissions and exposure within impacted communities. Assembly Bill (AB) 617[1] requires the California Air Resources Board (CARB) to prepare a statewide monitoring plan by October 1, 2018 that must evaluate the availability and effectiveness of air monitoring technologies and existing community air monitoring systems.[2] As air monitoring technologies and systems will continue to evolve and advance, this evaluation will be housed in the community air monitoring toolbox within the online Resource Center.[3]

The CARB Governing Board must also annually consider the selection of communities for the deployment of community air monitoring, as deemed appropriate. Once CARB has selected communities, air districts, working with the community, must deploy community air monitoring within 12 months following selection. However, for the first set of communities selected for community air monitoring under the Community Air Protect Program (Program), monitoring must begin by July 1, 2019. This new community air monitoring will augment other community-led and government-led air monitoring programs and enhance community-level coverage throughout the State.

With the advent of low-cost air quality sensors, community members are themselves taking more and more responsibility for measuring the air quality where they live, including community groups operating sophisticated air quality systems. Many of the initial community assistance grants[4] CARB awarded in the first year were for projects that include robust community-operated air quality sensor systems. CARB will work with community groups and air districts to incorporate the elements and guidance in this appendix into the design and operation of the community-operated systems so that the data from those systems can effectively support community needs.

The goal of air monitoring is to enhance our understanding of pollution impacts within communities, and support effective implementation of emissions reduction programs. A variety of air monitoring approaches may be utilized for community air monitoring, and the objectives, tools, and stakeholders involved may differ from community to community.

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[1] Assembly Bill 617, Garcia, C., Chapter 136, Statutes of 2017, modified the California Health and Safety Code, amending § 40920.6, § 42400, and § 42402, and adding § 39607.1, § 40920.8, § 42411, § 42705.5, and § 44391.2. See Appendix H for complete bill language.

[2] California Health and Safety Code § 42705.5(b).

[3] Appendix F provides more detail on CARB's online Resource Center, which includes monitoring information, along with CARB points of contact and links to air district webpages and other resources to improve Program implementation.

[4] California Air Resources Board, *2017-2018 Grant Guidelines, California Assembly Bill 617: Community Air Grants Program*, February 26, 2018, available at: https://ww2.arb.ca.gov/our-work/programs/Community-Air-Protection-Program.

For example, air districts may require fence-line monitoring[5] (i.e., air monitoring at or adjacent to a known stationary source) to determine where and when emissions are occurring, at what rate emissions are leaving the source, and what chemicals are released when fugitive emissions are present. Other air monitoring objectives include using more granular, local-scale monitoring methods to communicate air quality conditions within a community, identify contributing sources, and support the development of mitigation strategies. Air monitoring can also be utilized as a method to track progress on the community emissions reduction programs. Community air monitoring may not necessarily require U.S. Environmental Protection Agency (U.S. EPA)-designated methods and equipment, which provides the opportunity to utilize advanced air monitoring methods and big data solutions capable of providing greater spatial coverage and faster access to the resulting air quality data as they become available.

This appendix identifies and describes criteria for air districts and communities that are planning to conduct community air monitoring under the Program. Community organizations, air districts, and CARB have conducted successful community air monitoring programs that provide valuable best practices and learnings to jumpstart implementation of the Program. CARB staff have defined 14 elements to include in community-specific air monitoring plans that build from these existing programs. The 14 elements are flexible enough to apply to a variety of monitoring needs, yet rigorous enough to ensure that the data collected will support actions to reduce emissions and exposure within communities with high cumulative exposure burdens.

Planning elements fall into three key areas: (1) determine the reason for conducting community air monitoring; (2) describe how the community air monitoring will be conducted; and (3) identify how the data will support action to reduce air pollution within the community. These elements include specific criteria and best practices for: conducting community air monitoring; supporting collaborative partnerships between communities, air districts, and CARB in conducting air monitoring; and making the data accurate, accessible, transparent, and understandable. CARB has also created checklists to clarify the criteria required for community air monitoring plans (see the "Checklist for Community Air Monitoring Evaluation" section and Table E-2 in this appendix).

A number of activities are essential to support the successful implementation of community air monitoring. In addition to the criteria and evaluation checklists, community groups and air districts can access air monitoring guidance in CARB's community air monitoring toolbox housed within the online Resource Center. The goal of the community air monitoring toolbox is to:

[5] California Health and Safety Code § 42705.5(c).

- Support the process of fostering collaborative relationships for community air monitoring.
- Streamline data collection, display, and interpretation.
- Support the advancement and utility of air monitoring methods.

CARB's community air monitoring toolbox serves as a repository of community air monitoring information and guidance to be used by community members, air districts, health scientists, land use and transportation planners, and the public. This includes:

- Reviews of advanced sensing monitoring technologies.[6]
- Reviews of existing community air monitoring systems.[7]
- Supporting material for the development of community air monitoring plans.
- Resources for community scientists.

The air monitoring technology review will cover techniques ranging from deploying dense systems of small air sensors, to using approved criteria air pollutant or air toxics methods, to utilizing advanced remote sensing systems with a focus on characterizing performance and identifying appropriate applications for each method. CARB staff will conduct laboratory and field-based air sensor evaluations alongside partner programs at the South Coast Air Quality Management District (which operates the Air Quality Sensor Performance Evaluation Center program[8]), the U.S. EPA, and others who have experience conducting sensor evaluations. Information from these evaluations will be provided to assist communities and others in selecting methods they can trust to produce the type and quality of data required to meet their needs. Best practices gleaned from existing air monitoring systems will be compiled and documented to inform future air monitoring activities.

The community air monitoring toolbox will be periodically updated and expanded as new air monitoring information becomes available. Additional details on what information is provided in the community air monitoring toolbox and the online Resource Center can be found in Appendix F.

[6] California Health and Safety Code § 42705.5(a)(1).
[7] California Health and Safety Code § 42705.5(b).
[8] More information on the South Coast Air Quality Management District, Air Quality Sensor Performance Evaluation Center (AQ-SPEC) program is available at: http://www.aqmd.gov/aq-spec.

II. COMMUNITY AIR MONITORING PLAN ELEMENTS AND REQUIRED CRITERIA

CARB staff have defined criteria that air districts, communities, and others need to include in community-specific air monitoring plans developed under the Program. The elements are based on sound scientific principles and successful practices that build from knowledge gained through existing community air monitoring programs and accommodate the diversity of air monitoring objectives from community to community.

Community air monitoring may be employed to meet a number of objectives, from communicating current air quality conditions, to identifying the contribution of emission sources to community exposure, to evaluating air quality concerns within a community, to supporting public health research, or tracking progress for a community emissions reduction program. Air districts will report community air monitoring data to CARB and CARB will publish these data online.[9] Following the 14 elements helps CARB and the public understand the nature of the data generated and how it can be used. This will ensure that monitoring has been designed at a level of scientific rigor and the necessary duration of the monitoring has been defined to meet air quality goals and support actions for each community. CARB will review air district community air monitoring plans using the evaluation checklists to verify that criteria for each of the 14 elements are met prior to making the data available on the statewide data portal.

Although the 14 community air monitoring elements are presented sequentially (Figure E-1), air monitoring planning is often an iterative process that can occur in phases. An example of this is air monitoring that begins with an initial screening of the community to identify the most appropriate placement of more robust instrumentation. Establishing community partnerships at the onset of plan development is the first step to foster strong community participation throughout plan development and lay the groundwork for ongoing involvement during implementation. Working with community members is essential to develop an action-focused air monitoring objective specific to the community. Other elements may be addressed outside of the suggested sequence presented in this appendix, depending on the information and resources available and the specific concerns within a community. Broadly speaking, the 14 elements are used to define the scope of work and understand:

- What is the reason for conducting community air monitoring? (Elements 1-5)
- How will monitoring be conducted? (Elements 6-11)
- How will data be used to take action? (Elements 12-14)

[9] California Health and Safety Code § 42705.5(e).

Figure E-1 Community Air Monitoring Plan Elements

WHAT IS THE REASON FOR CONDUCTING COMMUNITY AIR MONITORING?

1. Form community partnerships.
2. State the community-specific purpose for air monitoring.
3. Identify scope of actions.
4. Define air monitoring objectives.
5. Establish roles and responsibilities.

HOW WILL MONITORING BE CONDUCTED?

6. Define data quality objectives.
7. Select monitoring methods and equipment.
8. Determine monitoring areas.
9. Develop quality control procedures.
10. Describe data management.
11. Provide work plan for conducting field measurements.

HOW WILL DATA BE USED TO TAKE ACTION?

12. Specify process for evaluating effectiveness.
13. Analyze and interpret data.
14. Communicate results to support action.

There may be instances where specific criteria are not applicable to an air monitoring plan, and the level of detail contained in each element may differ from community to community.[10] If criteria are not applicable, plans should indicate why the criteria are not relevant to the specific community air monitoring.

Air monitoring plans may undergo revisions and be resubmitted for review if air monitoring will occur in phases (e.g., screening for problems and then focusing in on problem areas or sources) or if new information becomes available as long as the community air monitoring planning process is followed. This allows air monitoring plans to accommodate changes and adapt as new information becomes available.

[10] CARB acknowledges that there may be cases where a community air monitoring plan fails to meet all procedural requirements but is still being developed in the spirit of these requirements. CARB will evaluate the extent to which deviations from these requirements are acceptable on a case-by-case basis and will communicate findings in writing.

Each element is discussed in more detail below. For the full list of criteria to be met within each element, refer to the "Checklist for Community Air Monitoring Evaluation" section and Table E-2 of this appendix.

What is the Reason for Conducting Community Air Monitoring?

Following community selection, the first step to developing an air monitoring plan is to form community partnerships through a community steering committee. Community members have detailed knowledge and awareness of community issues based on their experience of living and working in the community. Leveraging this knowledge and that of the air district to define community-specific air monitoring needs will form the foundation of the entire air monitoring process. Example needs could include: providing real-time air quality data to support notification systems and school flag programs; quantifying pollutants that are burdening the community; identifying sources of air pollution impacting the community; and evaluating pollution trends in the community prior to and after implementation of community emissions reduction programs. The air monitoring needs should be described in enough depth so the community steering committee can develop air monitoring objectives that yield data that can be used to establish air pollution levels within the community and support actions that reduce emissions or exposure. This should also include defining the appropriate duration for the air monitoring. Defining roles and responsibilities as part of the community partnership process will ensure expectations are understood and clarified as needed prior to beginning air monitoring. For example, in some communities residents may take an active role in leading or conducting air monitoring while in other communities residents may be involved in selecting monitoring locations with air monitoring conducted by air district staff. In total, working through these first five elements will help the air district, with input from the community steering committee, determine which air monitoring approaches are most appropriate.

Form Community Partnerships

Community members have first-hand knowledge that is vital in understanding and addressing local air quality challenges in their community. A collaborative partnership with the community throughout the air monitoring planning, development, and implementation process is essential to support effective community-focused monitoring. To facilitate this community-driven process, air districts must work with selected communities to convene a community steering committee. The community steering committee will have a fundamental role in designing and carrying out air monitoring goals and objectives, disseminating results to the community, and supporting effective local actions. More specific details related to participation in the community steering committee and committee meetings (e.g., public process, membership criteria, roles, responsibilities) are included in Appendix C.

Air districts must document relevant information on the community steering committee in the air monitoring plan. This includes:

- Proposed workshops.
- Community outreach frequency and materials.
- Contact information for a dedicated air monitoring contact person.
- A link to a webpage developed to inform the public on the community air monitoring initiative.

Development of community air monitoring plans will be a collaborative process with the community steering committee. The purpose of preparing an air monitoring plan with the community steering committee is to bring all parties to a common understanding of what air monitoring will achieve, potential limitations, what tools will be utilized to collect, review, and interpret data, and how data will be used. Some communities may participate only in the planning process, whereas some may play a leading role throughout implementation, for example, by securing sites for air monitoring, conducting measurements, or analyzing data. Community participation is important throughout the planning process to increase participants' technical capacity. The approach for community involvement should be documented to verify that the community has and will continue to contribute to decision-making processes. Community engagement will also be a crucial component during the development of CARB's community air monitoring data portal. Community steering committees will provide essential recommendations to help determine data display and interpretation needs for each unique community.

State the Community-Specific Purpose for Air Monitoring

The plan must clearly define the purpose for air monitoring. This may include background information on the community, pollutants of concern, known or expected locations of pollution, and potential sources.

If relevant air monitoring is currently being conducted, the planning team should also identify how the proposed community air monitoring will build from current air monitoring. Alternative approaches to investigating and addressing the air monitoring need(s) should be evaluated. Results from ancillary studies that may not directly include air monitoring (e.g., truck counts) should be discussed in the plan if they have informed the identification of the concern that will be addressed by air monitoring.

The systematic development of the community-specific air monitoring plan should not delay action that can quickly deliver emissions and exposure reductions. CARB encourages immediate implementation of any feasible activities identified in parallel with development of the plan.

Identify Scope of Actions

The plan must identify the desired scope of actions that may potentially be supported by air monitoring data, such as whether data will be collected to support real-time air quality notification systems; to identify areas that may be more heavily burdened by air pollution; or tracking the progress of community emissions reduction programs, including the potential need for additional emissions mitigation strategies. Identifying the desired action(s) that air monitoring data are intended to support will guide the process of defining the level of data quality needed and further set the context and focus for planning activities that follow.

Define Air Monitoring Objectives

The plan must describe the community's air monitoring objectives, discuss how meeting these objectives will address the monitoring need(s), and establish benchmarks for determining when air monitoring objectives have been met. These benchmarks will inform resource allocation in the "Specify Process for Evaluating Effectiveness" element. Per the requirements of AB 617, community air monitoring objectives should be designed to support action(s) that reduce emissions or exposure within a community.[11] While it is possible that air monitoring data may be used to address more than one objective, prioritizing objectives will help to ensure that air monitoring can be directed to address the most important objective.

Objectives that community air monitoring might be designed to address include:

- Identifying and characterizing areas experiencing disproportionate air pollution impacts.
- Identifying emissions sources and assessing their impact on air quality, including fence-line monitoring.
- Determining effectiveness of emission controls in reducing air pollution and assessing progress in improving community air quality.
- Providing real-time air quality information to inform community members of current conditions within the community.

Along with the air monitoring objective(s), the plan should include other relevant information such as background concentrations of the pollutant of interest, specific time periods of interest, threshold levels of concern, and known sources. Supporting measurements needed to address the objective, which may include meteorological data or measurements of pollutants other than criteria air pollutants or toxic air contaminants, should be defined in this step. The plan should include or reference existing information

[11] California Health and Safety Code § 42705(c).

and materials such as maps, diagrams, tables, and previous studies that can augment community air monitoring. If existing community air monitoring data are available, the plan should document the scope of the monitoring and explain how additional monitoring will expand or complement these existing programs. Example objectives and associated information inputs necessary to inform objectives can be found in the community air monitoring toolbox in the online Resource Center.

Establish Roles and Responsibilities

All parties responsible for major aspects of community air monitoring need to be identified in the plan and their roles and responsibilities be described. Air monitoring teams are typically composed of a project manager, technical staff, and stakeholders that are directly affected by air monitoring. Community members may also lead some community air monitoring or be direct participants and partners in air monitoring. An organizational chart can be provided to clarify group roles and interactions, and specific tasks, duties, and training that each party involved with air monitoring are expected to complete as a function of their role should be documented. Contact information for key members should be made available on the air district's designated community air monitoring webpage.

How will Monitoring be Conducted?

Documenting how air monitoring will be conducted is the next step in the planning process. Defining the quality of data that is needed for the proposed actions supports the selection of methods and equipment that are capable of producing data of appropriate quality. For example, more rigorous methods are required to support a regulatory action compared to an air quality awareness program. Identifying areas where monitoring is needed may also be important to selecting appropriate methods and equipment. For example, mobile monitoring may be effective at covering a broad area and determining where fixed sites should be established to observe trends. Once the methods and equipment are selected, defining quality control procedures and data management steps help ensure the resulting data is useful to inform the stated community-specific purpose for air monitoring and all parties can understand how the data was generated. After making these decisions, documenting the work plan provides clarity on how the field measurements will be made.

Define Data Quality Objectives

Plans must describe the level of data quality that will be required to support community air monitoring objectives, and list the data quality indicators that will be used to assure data quality objectives are met. Identifying data quality objectives early in the planning process will inform subsequent choices of methods and equipment capable of collecting data that meets community needs. Table E-1 lists the recommended data quality indicators that should be defined in community air monitoring plans, where appropriate.

Examples of air monitoring measurement methods and equipment and how each may meet specific data quality objectives are available in the community air monitoring toolbox in the online Resource Center.

Table E-1 Data Quality Indicators for Air Monitoring

Data Quality Indicators	Definition
Precision	The measure of agreement among repeated measurements of the same property under identical or similar conditions.
Bias	The systematic or persistent distortion of a measurement process which causes error in one direction.
Accuracy	A measure of the overall agreement of a measurement to a known value.
Sensitivity	The smallest absolute amount of change that can be detected by an instrument or method.
Completeness	A measure of the amount of valid data needed from a measurement system.
Representativeness	A qualitative term that expresses the degree to which data accurately and precisely represent the condition that is being measured in order to meet a specific monitoring objective.

Select Monitoring Methods and Equipment

Selecting appropriate methods and equipment is crucial to the success of community air monitoring because the resulting data needs to support effective action. Air monitoring methods include not only the air monitoring equipment used but also how it is operated and applied, whereas equipment solely describes the specific technology used for air monitoring. Methods and equipment must be capable of meeting the data quality objectives defined in the "Define Data Quality Objectives" section of this appendix.

There are a wide variety of methods and equipment. The plan must identify the selected method(s) and include a full description of the equipment that will be used (e.g., make, model, characteristics) and how it will be applied. The plan should justify the suitability of the method and equipment to meet the level of action required and include a description of how the selected method will achieve the data quality objectives. Limitations of selected air monitoring methods and equipment should be made clear to stakeholders and documented in the plan. Other method requirements or needs considered in the selection process should also be documented (e.g., maintenance requirements, operating costs, specific features). The plan should

also identify and describe any additional equipment needed to meet air monitoring objectives, such as meteorological monitoring equipment.

Information regarding applicability, performance, and example uses of air monitoring methods and equipment will be available in the community air monitoring toolbox section of the online Resource Center.

Determine Monitoring Areas

The plan should indicate where monitoring will be conducted within the community, describe the rationale for selecting specific locations, and document each site's purpose and characteristics. The process for identifying specific monitoring areas that will achieve the monitoring objective should be based on factors such as: public input from community members, review of existing air monitoring data, locations of source emissions, locations of sensitive populations, and results from air quality modeling. Selecting carefully designed locations with known characteristics will assist analysts in understanding what the data represents and how it can be used to support actions to reduce emissions and exposure in communities with high cumulative exposure burdens. The exact monitoring location will be a balance of a number of factors, often depending on the logistics of the specific area chosen for monitoring, such as site access, communications systems, security, and power availability.

It may be necessary to select alternative locations when determining specific monitoring areas due to factors such as site availability, site safety, source activity, etc. The reasons for selecting alternative locations should be documented in this element of the plan. Air districts should identify all areas where community air monitoring is taking place in support of the Program on their designated community air monitoring webpage.

Develop Quality Control Procedures

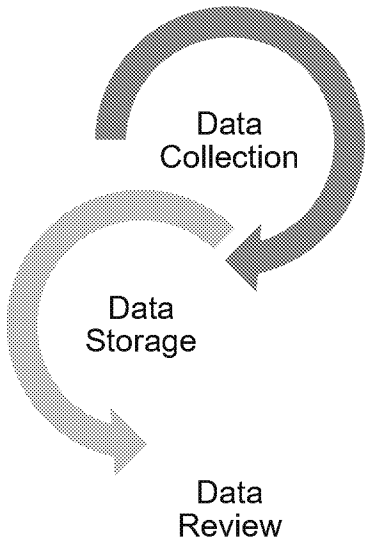
Quality control is a set of routine procedures implemented during air monitoring to ensure that data quality objectives are being met and the resulting data will be scientifically defensible. These technical activities should be routinely performed to measure or estimate the effect of any errors and determine when corrective action should be taken.

The community air monitoring plan must specify the quality control procedures and the frequency at which they will be performed for each monitoring method. Examples of quality control procedures include describing field and laboratory calibration practices, periodic precision and accuracy checks, and routine audit functions. Specific quality control procedures will depend upon the method used for air monitoring. Examples of quality control procedures for different air monitoring methods are available in the community air monitoring toolbox in the online Resource Center.

Describe Data Management

The plan must describe how data will be collected, managed, and stored. This is often done by providing data descriptors, data storage attributes, and data review and flagging procedures. The first phase of data management (Figure E-2) begins with the collection of analytical results. Besides capturing the value of interest, it is essential to capture additional descriptors, including instrument identifiers, date stamps, measured units, and other parameters that identify important attributes of the data.

Figure E-2 Data Management Phases



Data storage is the second phase of data management. Generally, this takes place in some form of database. In addition to the data descriptors established in the first phase, the stored data must also maintain data storage attributes, which are specific to how the data is stored and processed. These additional attributes include data quality indicators, data qualifiers, ingest dates, and chain of custody.

The attributes and values collected in the data acquisition and data storage phases must provide ample tools for an operator or system to conduct detailed and thorough reviews of the data in the data review phase. Data review and flagging procedures that will be utilized should be documented in this element of the plan. Examples include confirming that calibrations are excluded from data aggregation, confirming that incompletely sampled time periods are not included, and confirming that temperature controls required for proper instrument functioning were maintained.

Provide Work Plan for Conducting Field Measurements

The plan must describe field procedures that will be followed by those conducting measurements and provide the timeline for community air monitoring. Field procedures spell out individual tasks with enough detail so that air district staff or community members with the necessary training can complete the tasks. Examples of specific field procedures include documenting actions in logbooks, completing chain of custody forms, and conducting specific quality control procedures. The timeline needs to establish the duration of field measurements and denote milestones for completing key

tasks. The plan will also describe communication and coordination steps to ensure field personnel know whom to contact for questions and how work products are delivered. Relevant safety considerations should also be documented.

How will Data be Used to Take Action?

Defining how the data will be evaluated and applied to the stated community-specific purpose and objectives is the final step towards ensuring that the results will meet the needs of the community and support actions to improve air quality. Plans need to include a process for evaluating effectiveness, for example monthly or quarterly meetings to review results and determine if adjustments are needed. Determining in advance how data will be analyzed and interpreted, for example trends analysis or identification of source impacts, or providing real-time information for health alerts, provides another opportunity to confirm that air monitoring methods and equipment will achieve the desired objectives. Finally, planning in advance how and when the air monitoring results will be communicated, for example in real-time on a webpage or in written reports on a periodic basis, helps communities and stakeholders understand where and when they will be able to access the information.

Specify Process for Evaluating Effectiveness

The purpose of this element is to designate a procedure that will serve as a check to ensure that the air monitoring objectives are being met in a timely fashion. The process to revise the monitoring plan or make corrections if it is not meeting the air monitoring objectives or timeline must be described in this element of the air monitoring plan. If issues arise during air monitoring and data quality objectives should be adjusted, describe the process that will be utilized to make alterations and how they will be documented.

The plan should address the planned duration of the monitoring, whether it is intended to be a long-term sustainable program or a shorter-term investigation, and the timeframe for demobilization of air monitoring when objectives are met. This should also include recommendations for any necessary ongoing actions to track progress and ensure air quality improvements continue.

Analyze and Interpret Data

There are many approaches to data analysis and interpretation that vary in scope and complexity. Approaches such as conducting fence-line monitoring may require both real-time analysis and interpretation to screen for fugitive emissions and subsequent analysis of long-term data to track emissions reductions over time. This element of the plan must describe how data analysis will be conducted, including data preparation procedures utilized throughout the process, and how air monitoring results may be translated into actions.

The significance of results depends on the quality of the data, so data preparation is a critical component in data analysis. Data preparation procedures that will be utilized (e.g., formatting and quality assurance of data) must be documented. The protocol for providing data handling algorithms for the raw data should be documented to ensure transparency. Procedures used must document how data are handled and processed so that all changes to data are annotated and provide a clear, transparent data path that can be followed from initial data production to a final, quality-checked end point.

Ultimately, results from data analysis should be responsive to the established community air monitoring objectives. The types of analyses will depend on the specific community's goals, and each community is likely to require a unique analysis. Some analysis examples include, but are not limited to:

- Comparing trends in community air monitoring data to trends in data from nearby regulatory air monitors.
- Performing analysis to determine which source(s) may be primarily responsible for elevated concentrations in order to develop appropriate control strategies.
- Tracking progress over time to determine if strategies put in place by community emissions reduction programs yield ambient air quality improvements.

The plan should describe the anticipated data analyses along with a process for interpreting results based on the community-specific monitoring objective(s). This includes reviewing the scope of actions that the specific type of data analysis will support, since results produced through this element will be the direct link to action in a community. Thoroughly documenting data preparation procedures and types of analyses that will be conducted with the data is pivotal to ensuring that conclusions drawn from data analyses are defensible.

COMMUNICATE RESULTS TO SUPPORT ACTION

Communicating results is critical for ensuring that the air monitoring results in effective action. The community steering committee must establish a transparent process for systematic information sharing and communication. The monitoring plan must indicate how results will be delivered and discussed with community members, decision makers and organizations that have influence to take actions for a specific community. Air districts must communicate ongoing monitoring activities, provide interim progress updates, and publish final results.

The plan should detail what information will be provided on the designated air district webpage (e.g., web portals, factsheets, notices, timeline, meeting agendas, deliverables) and the frequency at which material will be provided and updated. The frequency and content that will be included when updating CARB must be documented.

The plan should also lay out the general content and frequency of reports. The final report includes, at a minimum:

- A summary and timeline of air monitoring with background on the reasons for air monitoring.
- A discussion of how data were collected, validated, analyzed, and disseminated to address the stated community-specific purpose for air monitoring.
- Recommendations and next steps, which may include recommendations for ongoing air monitoring to track progress or verify results achieved by community emissions reduction programs.
- A dissemination plan describing how the data will be disseminated and discussed with appropriate decision makers so that it may lead to the intended action.

AB 617 requires air districts report community air monitoring data to CARB.[12] Air quality data generated under the Program will be made available on CARB's webpage to ensure that community air monitoring data are publicly accessible. To this end, CARB will work to establish or recommend consistent data exchange standards to be used for community air monitoring. These uniform data formatting requirements will inform users about the conditions under which data were collected and will ensure that all community air monitoring data are compatible with CARB's statewide data portal. When established, formal data exchange standard requirements will be available in the community air monitoring toolbox in the online Resource Center.

[12] California Health and Safety Code § 42705.5(e).

III. CHECKLIST FOR COMMUNITY AIR MONITORING EVALUATION

Table E-2 Checklist for Community Air Monitoring Evaluation

MONITORING PLAN ELEMENT 1: FORM COMMUNITY PARTNERSHIPS	
CRITERIA	✓
Identifies community steering committee members and their affiliation.	☐
Documents community steering committee meeting information: • Date of first meeting. • Date, time, number of attendees for all meetings that have been held. • Frequency of future meetings and expected attendees.	☐
Details level of community involvement in planning and resources made available to accommodate community's desired level of involvement throughout implementation.	☐
Provides link to air district webpage dedicated to community air monitoring and documents what will be posted on this webpage.	☐
Identifies dedicated contact person to address questions on the community-specific air monitoring plan.	☐

MONITORING PLAN ELEMENT 2: STATE THE COMMUNITY-SPECIFIC PURPOSE FOR AIR MONITORING	
CRITERIA	✓
Identifies the community-specific air monitoring need(s).	☐
Provides background information on how the need was discovered.	☐
Documents relevant information from previous, ongoing, and proposed air monitoring and identifies gaps that this community air monitoring will address.	☐
Explores alternative approaches to investigating and addressing the air quality monitoring need(s).	☐

MONITORING PLAN ELEMENT 3: IDENTIFY SCOPE OF ACTIONS	
CRITERIA	✓
Defines action(s) that air monitoring aims to support.	☐

MONITORING PLAN ELEMENT 4: DEFINE AIR MONITORING OBJECTIVES	
CRITERIA	✓
States the air monitoring objective(s) that will address the stated community-specific purpose for air monitoring.	☐
Specifies the community air monitoring design: • Type(s) of data needed. • Measurements to be made. • Duration of monitoring.	☐
Defines other information necessary to address objective(s), such as: • Supporting measurements (e.g., meteorology). • Action limits, threshold levels, regulatory information. • Data sources to be accessed and used.	☐
Includes reference information and materials (e.g., maps, diagrams, previous studies).	☐

MONITORING PLAN ELEMENT 5: ESTABLISH ROLES AND RESPONSIBILITIES	
CRITERIA	✓
Identifies all parties responsible for major aspects or phases of air monitoring (includes contractors).	☐
Clarifies group roles and interactions; specifies training requirements for individuals conducting air monitoring.	☐

MONITORING PLAN ELEMENT 6: DEFINE DATA QUALITY OBJECTIVES	
CRITERIA	✓
Sets performance and acceptance criteria for all data to be collected.	☐
Identifies precision, bias, accuracy, sensitivity, and data completeness needs.	☐
Defines temporal and spatial representativeness.	☐

MONITORING PLAN ELEMENT 7: SELECT MONITORING METHODS AND EQUIPMENT	
CRITERIA	✓
Identifies and describes method(s) and equipment selected (e.g., make, model, characteristics).	☐
Justifies suitability of the method to meet the level of action required by monitoring objective.	☐
Provides field and lab Standard Operating Procedures that will be followed.	☐

MONITORING PLAN ELEMENT 8: DETERMINE MONITORING AREAS	
CRITERIA	✓
Indicates where monitoring will be conducted within the community.	☐
Describes rationale and considerations for each monitoring area.	☐
Details location characteristics (e.g., meteorology, sources, land use) and important logistical details (e.g., site access, security, power availability).	☐

MONITORING PLAN ELEMENT 9: DEVELOP QUALITY CONTROL PROCEDURES	
CRITERIA	✓
Specifies quality control activities for each type of measurement and the frequency at which they should be conducted – this includes, if applicable: • Reference materials. • Calibration. • Ongoing quality control measures (e.g., zero point, span point, one point). • Blanks. • Spikes. • Duplicates/collocation. • Audits.	☐
Details process to follow when control limits are exceeded.	☐

MONITORING PLAN ELEMENT 10: DESCRIBE DATA MANAGEMENT	
CRITERIA	✓
Describes the data management system by identifying all of the following: • Data descriptors. • Data storage attributes. • Data review and flagging procedures.	☐
Identifies measures that will be taken to account for errors.	☐

MONITORING PLAN ELEMENT 11: PROVIDE WORK PLAN FOR CONDUCTING FIELD MEASUREMENTS	
CRITERIA	✓
Identifies field procedures and materials to be utilized for conducting community air monitoring.	☐
Defines field communication and coordination steps.	☐
Provides timeline that denotes air monitoring duration, frequency, and milestones.	☐

MONITORING PLAN ELEMENT 12: SPECIFY PROCESS FOR EVALUATING EFFECTIVENESS	
CRITERIA	✓
Identifies evaluation process that will be utilized to ensure air monitoring objectives are being met, including number, frequency, and types of evaluations that will be conducted.	☐
Describes how issues will be documented and addressed.	☐
Defines an end point for air monitoring.	☐

MONITORING PLAN ELEMENT 13: ANALYZE AND INTERPRET DATA	
CRITERIA	✓
Documents data preparation procedures that will be utilized.	☐
Describes how data will be analyzed to address the stated community-specific purpose for air monitoring.	☐

MONITORING PLAN ELEMENT 14: COMMUNICATE RESULTS TO SUPPORT ACTION	
CRITERIA	✓
Establishes process for information sharing and communication with community throughout air monitoring.	☐
Indicates how results will be delivered to affected community, stakeholders, CARB, and other decision-makers (e.g., content, frequency).	☐
Details what information will be provided on district webpage (e.g., factsheets, notices, timeline, meeting agendas) and the frequency at which material and progress updates will be provided.	☐
Defines the format and schedule of reports.	☐

IV. COMMUNITY AIR MONITORING DATA PORTAL

While displaying data and communicating results is an essential element of each community air monitoring plan, the State also has a role in improving communication and information sharing with communities. This is further prescribed by AB 617, which requires that air districts report data from community air monitoring to CARB, and that CARB publish these data online.[13] To address this requirement, CARB is developing a data portal, which will allow reporting of both real-time preliminary data and validated final data. This data portal will be available on CARB's webpage to ensure that

[13] California Health and Safety Code § 42705.5(e).

community air monitoring data are publicly stored and accessible, and not housed solely in proprietary systems. Within and outside of CARB, a number of monitoring efforts and data portals, ranging from the regional to community level, have already been developed. Staff intend to use these projects and portals as models, and build on those past experiences and learnings. Staff also anticipate that many community groups and air districts will develop and maintain their own data display systems. Staff will collaborate with these entities to ensure that data display systems for community monitoring efforts are complementary. By partnering with communities, air districts, and other stakeholders, CARB will leverage existing and future resources to ensure that Program goals are met. CARB staff expect the data portal to be available by summer 2019. Additional information on the data portal can be found in Appendix F.

V. RESOURCES FOR COMMUNITY AIR MONITORING

CARB's community air monitoring toolbox, housed within the online Resource Center, will serve as a repository of community air monitoring information and guidance to be used by community members, air districts, and the public alike. This will include reviews of advanced sensing monitoring technologies,[14] reviews of existing community air monitoring systems,[15] supporting material for the development of community air monitoring plans, and resources for community scientists. CARB staff will partner with air sensor testing programs conducted by the South Coast Air Quality Management District's Air Quality Sensor Performance Evaluation Center, U.S. EPA, and others to evaluate air sensor performance and will house this information in the community air monitoring toolbox. Further, the community air monitoring toolbox will provide educational or informational materials on monitoring equipment, data collection methods, limitations of data, and so on. This toolbox will build on and complement learnings from community-led air monitoring activities, the California Environmental Health Tracking Program, the U.S. EPA Air Sensor Toolbox, and air monitoring resources developed under South Coast Air Quality Management District's U.S. EPA "Science To Achieve Results" grant. These informational resources will provide insight on how to appropriately interpret and use the data residing in the data portal. Therefore, the data portal will have direct materials and links to the community air monitoring toolbox, and vice versa. CARB staff will continue to work with air districts, community members, industry, and others to update and expand the air monitoring toolbox as new air monitoring materials and data become available.

[14] California Health and Safety Code § 42705.5(b).
[15] California Health and Safety Code § 42705.5(b).

Quality Assurance Statement

CARB undertakes regulatory monitoring across the State of California and the staff from the Monitoring and Laboratory Division have extensive knowledge and documentation of standard operating procedures to ensure quality assurance through quality checks and quality assessment protocols.

CARB staff will develop a community air monitoring plan (CAMP) for this project based on the CARB AB 617 Blueprint Appendix E[i]. A CAMP includes sections to establish roles and responsibilities, define data quality objectives, develop quality control and quality assessment procedures, and describe data management practices. CARB staff have been involved in writing and reviewing of CAMPs throughout the AB 617 program and will leverage their knowledge and expertise to ensure that the data quality assurance and quality control is adequately documented for the proposed project.

The project will involve discrete canister and filter sampling for lab analysis and deployment of sensors to measure black carbon (BC) and $PM_{2.5}$. We will largely follow the relevant data quality objectives, quality checks, and quality assessment documented in the Quality Assurance Project Plan (QAPP) for the Study of Neighborhood Air Near Petroleum Sources (SNAPS)[ii]. The SNAPS program is CARB's first extensive community monitoring project. The program combines continuous and discrete sampling using stationary and mobile monitoring platforms measuring over 200 compounds in a community over several seasons. The SNAPS QAPP encompasses the discrete media-based sample analysis in the proposed project.

The Quality Control (QC) procedures will involve all instruments being calibrated:

- During installation and at the frequency outlined in the SOP
- Following physical relocation
- Prior to instrument shutdown
- After major maintenance
- After the instrument has drifted out of acceptable QC limits

Calibrations will be conducted for both response and/or sampling flowrate. We will use existing standard operating procedures (SOP) for each instrument[iii] and for laboratory procedures[iv] and ensure that best practices are documented and disseminated to community members during training. All corrective actions will be documented on QC maintenance sheets and transferred to electronic log forms in the data management system. For discrete samples, we will follow sample holding times and conditions outlined in Table B7 of the SNAPS QAPP. A written chain of custody will be documented for each sample and include possession, transfer, and location of each sample throughout the lifecycle of the sample media. The QC process that we will document in the CAMP will maximize achieving data quality objectives (see Table 1) and serve as a template for any future community-led air quality monitoring.

Monitoring Type	Precision	Bias	Accuracy	Sensitivity	Completeness
Canister and filter sampling	±30% of collocated samples	N/A	±10% for sample flow	Defined in laboratory SOP[iv]	±4.2% for 24-hour sample
Low-cost sensor $PM_{2.5}$	≤ 5 μg/m^3 or ≤ 30% (CV)	Slope of 1.0 ± 0.35	$r^2 > 0.7$	1 μg/m^3	75% of hours in a day
Aethalometer BC	≤ 0.5 μg/m^3 or ≤ 30% (CV)	Slope of 1.0 ± 0.35	$r^2 > 0.7$	0.1 μg/m^3	75% of hours in a day

Table 1 – Data quality objectives for different monitoring methods proposed

A key difference in the proposed project (relative to the SNAPS program) is building capacity within communities for community-led monitoring. We will aim for the same data quality objectives as outlined in the QAPP but anticipate this may be a challenge for sample media initially as newly trained community groups begin monitoring. We will deploy multiple discrete sampling sites in a community that will make measurements on the same schedule. These will provide information on spatial variability, but also aid the quality assessment and identify potential issues with particular samples, e.g. if they systematically deviate from other locations. To address issues rapidly and minimize potential sample loss, CARB staff will meet regularly to discuss data capture status, completeness, validity, representativeness, and any programmatic issues. Operational factors affecting data quality objectives will be quickly identified and corrective actions will be implemented to maximize the collection of accurate and useful data. Issues will be documented so that training can be modified to minimize the chance of issues reoccurring in future deployments.

Sensors will be collocated alongside reference instrumentation prior to deployment to check performance and apply sensor specific adjustments. For this we will follow the guidance in the EPA Performance Testing Protocols, Metrics, and Target Values for Fine Particulate Matter Air Sensors[v]. For black carbon we will perform a similar collocation and make use of prior collocation data between several different aethalometers performed by CARB.

CARB will make use of laboratory web services to ingest data automatically into a project database, thereby reducing the opportunity for data loss and human error. Data reporting will be conducted each month to allow for data review by CARB staff. All data collected will be meta-tagged and formatted into a unified database. Ultimately, quality-assured data will be made available to the public via CARB's AQview platform.

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[i] Community Air Protection Blueprint - Appendix E. Statewide Air Monitoring Plan. https://ww2.arb.ca.gov/sites/default/files/2020-03/final_community_air_protection_blueprint_october_2018_appendix_e_acc_0.pdf

[ii] SNAPS QAPP. https://ww2.arb.ca.gov/sites/default/files/2019-07/SNAPS%20QAPP%20May%202019.pdf

[iii] SOPs for ambient air monitoring. https://ww2.arb.ca.gov/resources/documents/standard-operating-procedures-ambient-air-monitoring

[iv] Laboratory SOPs for ambient air monitoring https://ww2.arb.ca.gov/laboratory-standard-operating-procedures-ambient-air

[v] EPA Performance Testing Protocols. https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=350785&Lab=CEMM

Manifest for Grant Application # GRANT13580401

Grant Application XML file (total 1):

1. GrantApplication.xml. (size 30680 bytes)

Forms Included in Zip File(total 6):

1. Form ProjectNarrativeAttachments_1_2-V1.2.pdf (size 16134 bytes)

2. Form SF424_3_0-V3.0.pdf (size 24251 bytes)

3. Form SF424A-V1.0.pdf (size 22504 bytes)

4. Form EPA4700_4_3_0-V3.0.pdf (size 22795 bytes)

5. Form OtherNarrativeAttachments_1_2-V1.2.pdf (size 15911 bytes)

6. Form EPA_KeyContacts_2_0-V2.0.pdf (size 37360 bytes)

Attachments Included in Zip File (total 14):

1. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1244-Cert Regarding Lobbying_ARP_Signed_3.22.22.pdf application/pdf (size 601533 bytes)

2. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1243-Resume - Combined.pdf application/pdf (size 608462 bytes)

3. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1245-Attachment C - Maps.pdf application/pdf (size 345241 bytes)

4. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1235-Quality Assurance Statement Final.pdf application/pdf (size 182004 bytes)

5. ProjectNarrativeAttachments_1_2 ProjectNarrativeAttachments_1_2-Attachments-1234-2022-03-22 RFP Workplan Final.pdf application/pdf (size 237514 bytes)

6. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1240-CCAT_Letter_of_Support.pdf application/pdf (size 1424227 bytes)

7. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1239-LCJA Support Letter.La Vina.pdf application/pdf (size 120140 bytes)

8. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1246-community_air_protection_blueprint_appendix_e.pdf application/pdf (size 323965 bytes)

9. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1242-Moses_Huerta_Letter_of_Support.pdf application/pdf (size 209256 bytes)

10. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1241-Comite_Pro_Uno_Letter_of_Support.pdf application/pdf (size 275814 bytes)

11. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1247-SNAPS QAPP May 2019.pdf application/pdf (size 1986242 bytes)

12. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1236-CCAC

Support Letter_CARB ARP Grant App Mar10.22.pdf application/pdf (size 489416 bytes)

13. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1238-DPR Letter of Support_PPD_ARB.pdf application/pdf (size 207265 bytes)

14. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1237-CCEJN letter of support for CARB proposal. Final.pdf application/pdf (size 114690 bytes)

I. Cover page

Project Title:

Community Air Monitoring in California with Promoted Community Engagement and Partnership

Applicant Information:

- California Air Resources Board
- 1001 I St Sacramento, CA 95814
- Michael Miguel, (916) 322-0960, michael.miguel@arb.ca.gov
- DUNS Number: 195930276

Set-Aside: No set-aside

Brief Description of Applicant Organization:

The California Air Resources Board (CARB) is charged with protecting the public from the harmful effects of air pollution and developing programs and actions to fight climate change and reduce exposures to air toxics. CARB's mission is to promote and protect public health, welfare, and ecological resources by effectively reducing air pollutants while recognizing and considering effects on the economy. CARB is the lead agency for climate change programs and oversees all air pollution control efforts in California to attain and maintain health-based air quality standards and develop regulations to reduce exposures to unhealthy air pollutants.

Project Location:

La Viña, CA 93637 and Maywood-Vernon-Bell-East Commerce, CA 90023

Air Pollutant Scope:

- Particle Pollution (ultrafine, PM2.5, or PM10), including aerosol composition (metals, ions, elemental carbon, organic carbon, etc.) and PM precursors
- Hazardous Air Pollutants (HAPs), commonly referred to as air toxics (e.g., hexavalent chromium, lead, nickel, cadmium, BTEX, formaldehyde)

Budget Summary:

EPA Funding Requested	Total Project Cost
$499,100	$499,100

Project Period:

November 1, 2022– November 30, 2025

Short Project Description:

The project will utilize community engagement and partnership to co-design and implement air quality monitoring in two distinct environmental justice (EJ) communities in California with the goal to inform the development of a statewide community air monitoring program and guide the enhancement of CARB's air toxics program.

II. Workplan

Section 1 Project Summary and Approach

A. Overall Project

CARB seeks $499,100 in grant funds under the American Rescue Plan Grant Competition for Enhanced Air Quality Monitoring for Communities (EPA-OAR-OAQPS-22-01) to conduct community-scale air quality monitoring in partnership with residents and representatives of two EJ communities in California impacted by health disparities exacerbated by COVID-19. This proposal's pilot project augments the lessons learned through CARB's implementation of various programs addressing local scale air quality issues to inform the development of future statewide community air monitoring plans and provide enhancements to CARB's air toxics program.

CARB established the Community Air Protection Program (CAPP)[1] to implement Assembly Bill (AB) 617, passed by the California Legislature in 2017. CAPP ensures that all Californians benefit equitably from our State's air quality and climate efforts, especially those who live in the areas of California most severely impacted by air pollution. The CARB Board has selected seventeen communities to implement CAPP, of which fifteen are developing or implementing Community Air Monitoring Plans (CAMPs). The community steering committees convened by the air districts provide a platform for community members to voice their opinion on building these CAMPs tailored to the community's unique monitoring needs. The Community Air Grants Program[2] created under the AB 617 process provides funds to community-based organizations for technical assistance and to support their efforts in this process. Many of these grants support community-based monitoring and community engagement. CARB recently developed the Study of Neighborhood Air near Petroleum Sources (SNAPS)[3] program to better characterize air quality in communities near oil and gas operations through limited-term, intensive air quality monitoring with a particular focus on production facilities.

The implementation of these programs has provided state, local, and community partners valuable lessons, experience, trust-building, and a foundation in community engagement to develop community-led local-scale air quality monitoring plans to identify and address the community's concerns. These will be the guiding principles to inform and build future statewide community air monitoring systems. CARB will use the grant monies to directly engage with community members in co-designing monitoring plans, including training residents to participate in monitoring and air quality sampling through partnerships with community-based organizations.

Implementing these programs has required CARB to engage with communities more directly and profoundly through participation in many discussions across many communities across California. The lesson of engaging early and often is applied to CARB's Air Toxics Program. Through this program, CARB has engaged with community groups across the state to identify their air toxics concerns. This has helped direct CARB in developing strategies for future emissions reduction opportunities such as through regulatory Airborne Toxics Control Measures (ATCMs). CARB's community engagement has helped CARB identify its plan to evaluate measures to reduce air exposures to toxic metals. CARB's Air Toxics Program[4] is a comprehensive program that is driven by legislation and requires CARB to identify air toxic pollutants, assess the need for emission controls, and develop statewide ATCMs. The Program also includes a component that requires facilities to report their emissions, local air districts to prioritize the risks from these facilities, require significant risk facilities to conduct health risk assessments, and to reduce these risks to the community. An important component of the program also addresses the risk to children and other sensitive receptors from air toxics.

CARB will use grant monies to procure equipment and showcase how communities can develop and support comprehensive community air monitoring programs now and in the future. This project follows a

novel approach of extensive community engagement to monitor air toxics of concern with the potential of revealing new and emerging pollutants. CARB will use the requested grant funds of $499,100 to:

- Generate data to help accelerate California's regulatory efforts to reduce air toxics emissions in communities overburdened by these exposures
- Foster community engagement, participation, and capacity building through stipends
- Purchase samplers, canisters, and low-cost sensors to support monitoring
- Support chemical speciation using analytical labs
- Support monitoring efforts of our project partner, the Department of Pesticide Regulation (DPR)
- Develop tools for data analysis and communication

The project's proposed communities have been strongly recommended for inclusion in the CAPP program based on public outreach, community collaboration, and public comments during CAPP's annual community selection process. La Viña, CA, is a primarily rural and agricultural community and Maywood-Vernon-Bell-East Commerce, CA, is a highly industrialized and urban community.

B. Project Significance

This project supports CARB's efforts to reset the AB 617 program by working with communities eligible for the program but not yet selected. Applying the lessons learned from the AB 617 CAMPs will help CARB expand efforts to partner with community-based organizations supporting community-focused monitoring efforts. This project will also inform future strategies and actions under the Air Toxics Program. Both communities chosen for this project are disproportionately impacted by poor air quality and suffer from health disparities exacerbated by COVID-19. The La Viña community is primarily Spanish-speaking and represents an opportunity for CARB to demonstrate effective partnership through culturally competent and accessible engagement.

La Viña is an unincorporated EJ community in Madera County within the San Joaquin Valley Air District. As per the 2019 American Census Survey[5], this community has a population of 211, and 100% of its residents are of Hispanic descent. About 96% of La Viña residents live below the poverty line. The income per capita of La Viña is $4,563, which is only about 10% of the State's ($36,955). There are no hospitals, childcare facilities, or nursing homes within this community (Attachment C - Maps). The La Viña Elementary School is the only nearby educational facility.

La Viña is an agricultural community, and many of its residents work in agriculture-related fields[6]. Food and agricultural processing facilities are the largest stationary source emitters in La Viña, contributing to almost all stationary source PM2.5 and ROG emissions. According to CARB's preliminary draft estimates[7], farming equipment is responsible for 83% of PM2.5 and 46% of ROG emissions from mobile sources. Farming operations made up 97% of ROG emissions from area-wide sources. Cooking, farming operations, and unpaved road dust contribute to 30%, 27%, and 9% of PM2.5 emissions from area-wide sources, respectively[7]. The community is representative of many other communities in the Central Valley; therefore, findings in La Viña will be valuable for many other agricultural communities in the region.

Exposure to pesticides is a significant concern for community members. CARB will rely on its partnership with the DPR in the current AB 617 communities of Shafter[8] and Eastern Coachella Valley[9] to work together with La Viña community members to expand pesticide monitoring in that area.

Maywood-Vernon-Bell-East Commerce (Attachment C - Maps) is an EJ community in Los Angeles County within the South Coast Air District that spans 13 square miles. As per CalEnviroScreen[10] (CES) 4.0, this community has about 102,000 residents, with about 95% of Hispanic descent, followed by whites (about 3%), African Americans (about 1%), and Asian Americans (about 1%). The community's

socioeconomic factors rank within the 99th, 98th, 94th, and 93rd-percentile within the State for education, linguistic isolation[11], poverty, and unemployment, respectively, showing significant burdens.

Maywood-Vernon-Bell-East Commerce is an urban community. According to CARB's preliminary draft estimates[7], PM2.5 from wood and paper accounts for 12%, while manufacturing and industrial processes contribute to 9% of PM2.5 emissions from stationary sources. Mobile sources are the largest sources of NOx and DPM emissions (75% and 88%, respectively). Commercial cooking PM2.5 and consumer products ROG emissions are the largest area-wide sources (16% and 25%, respectively).

Section 2 Community Involvement

A. Community Partnerships

Central California Asthma Collaborative[12] (CCAC) is a non-profit organization with a mission to increase capacity for asthma-related education and advocacy in Fresno and Madera counties, as well as organizing and supporting other county asthma coalitions across the San Joaquin Valley. CCAC will assist in meaningful community engagement, including members from Madera Youth Leaders to participate in sampling and monitoring activities and advise CARB on how best to engage residents in sampling design, data integrity, and interpretation of data.

The Central California Environmental Justice Network[13] (CCEJN) serves as a hub for environmental activism in the Central Valley, aiming to empower communities and secure children's future by eliminating negative environmental impacts in low-income and communities of color. CCEJN has been engaged since 2014 in multiple community air monitoring programs across the San Joaquin Valley that include a variety of methodologies (i.e., grab samples/bucket samples, temporary stationary monitoring, permanent stationary monitoring). To support AB 617 community air monitoring, CCEJN is partnering closely with the statewide collaborative Allies in Reducing Emissions[14] and the region-wide collaborative San Joaquin Valley Environmental Justice Collaborative, which is comprised of CCEJN, Central Valley Air Quality Coalition[15], and CCAC to assess and measure air quality in EJ communities heavily burdened by pollution due to their proximity to oil and gas facilities, distribution centers, incinerators, and biomass facilities.

Leadership Counsel for Justice and Accountability[16] (Leadership Counsel), located in the San Joaquin and Eastern Coachella Valley, works alongside the most impacted communities to advocate for sound policy and eradicate injustice to secure equal access to opportunity regardless of wealth, race, income, and place. Leadership Counsel partners with a dedicated community group of about 40 La Viña residents, with whom they have been working for several years. Leadership Counsel will be a crucial partner in community engagement in La Viña, and their extensive knowledge and experience in addressing local issues will help CARB prioritize sources of concern for monitoring.

CCEJN has partnered with the Leadership Counsel in La Viña to install air monitors potentially. CCEJN will be a crucial partner in engaging community members on monitor placement and building partnerships for community-led sampling wherever possible. The technical expertise provided by CCEJN could help foster community engagement to assist in sampling.

The DPR Air Program[17] has collaborated with CARB and various air districts and assisted with the AB 617 communities of Oakland, Imperial, Shafter, Wilmington/Carson/West Long Beach, and Easter Coachella Valley on pesticides concerns. As the primary regulating government entity over pesticides, DPR provides each community with background on pesticide use in the area and presents technical expertise on current air monitoring technologies and techniques. The community of La Viña is ranked 5th on DPR's list initial top 30 ranked communities for fumigants monitoring. DPR is partnering to support community engagement and provide technical guidance and support of pesticide monitoring in La Viña.

CARB and the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment[18] (OEHHA) partnered in recent years to address community concerns related to health effects of pollutants and also identify air toxics, including pesticides, that can be prioritized for monitoring in certain AB 617 communities. CARB will rely on OEHHA to provide guidance on toxics monitoring and data interpretation. Additional community partnerships have been made with groups like the Coalition for Clean Air[19], Communities for a Better Environment, East Yard Communities for Environmental Justice[20], California Communities Against Toxics, Comite Pro-Uno, and the Del Amo Action Committee[21] to address air toxics in several communities within the South Coast region. These groups are well established and are actively engaged in many of CARB's regulatory programs that address air toxic-related regulations and projects that reduce emissions of toxic air pollutants within southern California communities.

B. Community Engagement

CARB will rely on its established relationships with the project partners to develop community-specific engagement processes to strengthen the relationship with the community through several phases of the project design, implementation, and results dissemination.

CARB will leverage best practices learned from community engagement in the current AB 617 communities and apply them in La Viña and the Maywood-Vernon-Bell-East Commerce. CARB and its community partners will work together to identify key stakeholders that could include residents, faith-based organizations, city councils, businesses, local government, and other actively engaged groups within the community to guide the development of a project plan. For example, CCEJN could help obtain support from Madera Coalition for EJ's Youth Leadership Academy to strengthen community engagement further and perform the project effectively. In February of 2022, CARB announced the selection of a round of community air grantees as part of the CAPP. One of the grants was awarded to the CCAC, representing a coalition of San Joaquin Valley organizations to work directly with the La Viña community to develop a community-led emissions reductions strategy, informed by the findings of the La Viña monitoring project.

CARB will work with its partners to engage community members from the start of the project. Initial kick-off meetings can serve as a platform to identify key stakeholders, address project scope and timelines, and develop a plan for continued community engagement (such as quarterly meetings). CARB and its partners will utilize available data and information to develop a preliminary community profile that includes air quality concerns often raised by the community members. Through early phases of engagement, community input will guide further refinement of that profile and the development of a project plan. Active engagement and listening sessions between CARB and these communities are also a critical step in informing the communities on how to become involved in identifying and monitoring sources of air toxics. Stipends are budgeted to compensate community members for their valuable time, feedback, and direct participation in monitoring activities, throughout the process. In addition, CARB will learn how to make monitoring projects more accessible for all project phases, including sharing and interpreting findings.

It is expected that such engagement would lend into a development of a robust project plan that could include, but not limited to, building awareness within each community of the monitoring effort and resolving community questions and concerns; guiding monitor placement through community prioritization and review of preliminary screening monitoring (if applicable); and reviewing preliminary and finalized results to ensure the summarized and interpreted monitoring data are accessible and understood. The lessons learned in implementing AB 617 CAMPs, based on 14 elements as defined in Appendix E[22] of the CAPP Blueprint, will further enhance the development of the project plan.

CARB and its partners will develop project milestones and data visualization tools to provide periodic updates to the community stakeholders. CARB has designed the Community Air Quality Portal[23], Community Hub[24] and the Technology Clearinghouse[25] in recent years to support the AB 617 program

that could guide the development of similar tools if needed for this project. In addition, CARB and its partners will work with the community stakeholders to provide periodic progress updates via in-person or remote meetings or using a hybrid approach and a progress report if needed. CARB will work with project partners to develop a language justice approach for the La Viña community, including interpretation and document translation services for meetings, written documents, presentations, and online tools.

Section 3 EJ and Underserved Communities

As discussed under Section 1.ii, La Viña is a small, unincorporated EJ community in Madera County that is majority Latinx and low-income and faces a disproportionate pollution burden due to extremely heavy pesticide application, dust, vehicle exhaust, a processing plant at a nearby winery, and other sources. Residents of La Viña have advocated to CARB and to the San Joaquin Valley Air Pollution Control District for multiple years now to bring the AB617 program to their community.

As per CES4.0[10,26], the census tract that houses La Viña is in the 93rd-percentile of all census tracts statewide in terms of pollution burden. The resident's exposure to PM2.5 and pesticide are also among the highest in the State, at the 90th and 92nd-percentile, respectively. Residents also suffer from higher rates of asthma, low birth weight, and cardiovascular diseases than most of the State, at the 69th, 87th, and 83rd-percentile, respectively.

According to their local elected official, La Viña is also one of the communities most impacted by COVID-19 in Madera County. CCEJN has worked with residents who have tested positive, been hospitalized, and spent time in the ICU due to COVID-19. The community continues to voice concerns that worsening air quality can exacerbate dust episodes, and folks with COVID-19, asthma and other respiratory conditions struggle even more to breathe.

The community of La Viña has self-nominated for inclusion in the AB 617 for multiple years now. The CES data, CARB's emissions inventory, and above all, the testimonies of community stakeholders establish the cumulative air quality burden this community faces from multiple sources. CARB and its partners look forward to utilizing grant monies to begin a focused monitoring campaign within the community. In addition to providing a snapshot of La Viña's air quality, this pilot project shall serve as a model for future air monitoring in other communities. The air quality data obtained shall also guide the development of mitigation strategies up to the extent possible based on the representativeness of data collected and the availability of funds to implement those strategies.

The Maywood-Vernon-Bell-East Commerce community has some of the worst pollution burdens within the State, as the maximum CES score is at the 99th-percentile. Residents are exposed to various sources of pollution in the community, including traffic (100^{th}-percentile), lead from housing (100^{th}-percentile), EnviroStor[27] cleanup sites (99^{th}-percentile), and hazardous waste facilities (99^{th}-percentile). PM2.5, diesel PM, and modeled toxic releases ranked within the 88^{th}, 99^{th}, and 92^{nd}-percentile, respectively. Residents also suffer from higher rates of asthma, low birth weight, and cardiovascular diseases than most of the State, at the 95th, 89th, and 97th-percentile, respectively. An air monitoring program within this community will provide CARB and other regulatory agencies the information needed to make informed decisions on its subsequent mitigation actions. For example, the monitoring of air toxic metals and the purchase of the technologies to do this will provide CARB the data needed to further its evaluation of the sources and emissions of air toxic metals within this community and the ability to assess changes in the community in future assessments and regulatory actions.

Section 4 Environmental Results; Outcomes, Outputs, and Performance Measures

A. Expected Project Outputs and Outcomes, Performance Measures and Plan

The project will develop a methodology to monitor air toxics levels in the EJ communities with an emphasized element of community engagement. The method will include selecting communities, identifying the toxic air pollution problems in the communities, conducting community-level monitoring on air toxics, analyzing the air pollution data collected, interpreting the analysis results, and providing these results to local communities and local decision-making agencies. We will leverage the extensive CAMP development materials created for AB 617 (Appendix E of the CAPP Blueprint[22]). A critical component of CAMP development is making the data and results transparent and accessible to the public to ensure community members can understand and use the data to support community and local governmental actions. The method will be developed and demonstrated with two pilot studies in two distinct EJ communities in California (La Viña and Maywood-Vernon-Bell-East Commerce) as discussed above. The project will also suggest an approach on how public agencies can work with local community members to conduct community-level air toxics monitoring and have the communities be greatly involved in and exposed to the scientific processes in the monitoring project. A detailed list of expected project outputs, outcomes as well as performance measures is included in Table 2.

B. Timeline and Milestones

The project will be completed within three years upon the receipt of the grant funds. Table 1 shows the timeline of the project. Communities will be involved at the very beginning of the project, and the processes of open bidding and procurement will be conducted based on the inputs from the communities. As a community-led effort, community engagement will be a major component throughout the project, with periodic meetings, training sessions, and other formats of interactions. We will conduct one year of measurement campaigns in each community, and the actual schedule of the two campaigns will be determined based on the availability of the resources. The timeline below provides the estimated time window for the two campaigns.

Table 1. Project Timeline

Tasks	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Community meetings on project planning												
Open bidding for lab analysis												
Procurement of equipment												
Community training on sampling and operation												
Community monitoring												
Sample analysis												
Data review, analysis and interpretation												
Community meetings and interactions on monitoring results												
Data publication												
Quarterly report												
Final report												

Tasks with community engagement

Tasks completed by CARB staff

Table 2. Expected Project Outputs, Outcomes, and Performance Measures

Categories	Outputs	Outcomes	Performance Measures
Method development	• An integrated approach on community air toxics monitoring with an emphasized element of community engagement	A methodology to guide future community air toxics monitoring	• Project Final Report • Quarterly progress reports • Meeting and training materials • Feedback from the communities
Identification of air pollution	• Collective information from the communities on the air pollutants of interest and impacting sources • Suggested monitoring locations and periods • Analysis results from existing air quality data and community-level emission inventories	Initial understanding of air pollution problems in the communities to design the sampling plan	• Identified air pollutants of concern • Map and details information on potential monitoring sites • Analysis reports of the existing data
Deployment of equipment to conduct air quality monitoring	• Filter and canister samples at multiple sites in the two communities collected by community members • List of targeted speciation of PM and VOCs based on the inputs from the communities • Monitoring network with low-cost sensors for continuous measurement of $PM_{2.5}$, black carbon, CO and NO_2	A collaborative sampling method for the community members to lead and be heavily involved in	• Equipment purchased for sampling and monitoring • Co-designed sampling plan from CARB and the communities • Number of total samples and valid samples collected • Number of days for sensor monitoring
Community-specific assessments of air pollution data	• Concentration levels of various air pollutants in the communities • Spatial and temporal variations of air pollutant concentrations • Potential sources information related to the air pollutants	Enhanced understanding of air pollution problems in the communities	• Raw and processed air quality data from the project • Analysis reports on the data collected • Tools for data analysis and visualization • Feedback from the communities on the data analysis results
Air quality data availability	• Quality-assured data with transparency provided to the public for download and visualization	Ease to access and visualize the data	• Tools for public access and data download • Feedback from the communities on data accessibility and visualization
Promotion of partnerships and community involvement	• Meetings with communities to collect their concerns and discuss the results from the project • Training and demonstrations provided to the communities on how to collect samples and operate sensors • Involvement of community members to collect air samples and operate sensors with stipends provided	Heavy involvement of community members in the monitoring process and exposure of community members to the technologies	• Numbers of community meetings and training sessions • Meeting and training materials • Feedback from the communities on training, sample collection, and sensor operation • Capacities of communities to conduct similar monitoring projects independently
Reports	• Quarterly progress reports and project final report	Effectively track the progress of the project and address issues	• The time when the progress reports and final report are delivered

Section 5 Quality Assurance Statement

Please see the Optional Attachment for the Quality Assurance Statement.

Section 6 Programmatic Capability and Past Performance

A. Past Performance and Reporting Requirements

With respect to grant management, CARB has accepted several U.S. EPA grants in the past three years, including Section 105 Air Pollution Control Financial Assistance Grant (Grant Number A-00901315), PM 2.5 Monitoring Network Grant (Grant Number PM-98960901), and the State Clean Diesel Grant (Grant Number DS-00T87901). Each of these recent grants represents a continuation of a multi-year, multi-million dollar grant from the U.S. EPA. For each grant, CARB has completed all grant agreement terms and completed (or expects to complete) the approved work plans to expeditiously apply funds to shared U.S. EPA and CARB air quality goals. CARB has documented progress on these grants through submittal of required reports and inputting collected data into state and national databases, as appropriate per the grant terms.

Moreover, CARB has been charged with administering the Community Air Grants, as part of the AB 617 effort to support the community-based organizations to participate in the AB 617 process and to build capacity to become active partners with the government to identify, evaluate, and ultimately reduce air pollution and exposure to harmful emissions in their communities. Since 2018, a total of $15 million has been awarded to almost 50 community-based organizations and tribal governments for education and community air monitoring projects, with $10 million in addition for this year. CARB's experience in the Air Grant Program has established solid working relationships with communities for successfully implementing the proposed project.

B. Staff Expertise

The major participants for this project consist of staff members from multiple CARB Divisions, with diverse areas of expertise in community outreach and engagement, air toxics emission and community impacts, ambient air monitoring, and air quality data analysis. Detailed information for all the key staff is listed below, and the resumes are included in the attachment.

Table 3. Key Staff for the Project

Name	CARB Division	Title	Expertise
Robert Krieger	Transportation and Toxics Division	Air Resources Supervisor II	Air toxics emission and community impacts
Chandan Misra	Office of Community Air Protection	Air Resources Supervisor I	Community outreach and engagement
David Ridley	Monitoring and Laboratory Division	Air Pollution Specialist	Air quality monitoring and data analysis
Yanju Chen	Air Quality Planning and Science Division	Air Resources Supervisor I	Air quality monitoring and data analysis
Jennifer Magana	Office of Community Air Protection	Air Pollution Specialist	Community outreach and engagement, bilingual

Section 7 Budget

A. Budget Detail

Table 4. Project Costs and Funding Requirements

Line Item & itemized Cost	Units/Hours	Unit Cost	Cost	EPA Funding
Equipment				
1 canister sampler	1	$15,000	$15,000	$15,000
6 PM samplers	6	$9,000	$54,000	$54,000
3 enclosures	3	$6,000	$18,000	$18,000
3 flow calibrators	3	$5,000	$15,000	$15,000
PM sampling consumables (packs of 50)	15	$320	$4,800	$4,800
10 solar-powered BC, PM, CO and NO2 sensor	10	$5,000	$50,000	$50,000
10 WiFi Access Points	10	$1,200	$12,000	$12,000
TOTAL EQUIPMENT			$168,800	$168,800
Supplies				
Canister shipping services	600	$30	$18,000	$18,000
Protective shipping boxes	12	$325	$3,900	$3,900
TOTAL SUPPLIES			$21,900	$21,900
Contractual				
TO-15A sample analysis (w/ canisters and cleaning service)	312	$400	$124,800	$124,800
XRF metals analysis	144	$150	$21,600	$21,600
Further sample analysis	144	$300	$43,200	$43,200
TOTAL CONTRACTUAL			$189,600	$189,600
Other				
Stipends for planning meetings (6 x 2hr meetings for 20 community residents)	240	$75	$18,000	$18,000
Stipends for training meetings (6 x 3hr meetings for 12 community residents)	216	$75	$16,200	$16,200
Subaward(s) for deployment, sampling, maintenance	984	$75	$73,800	$73,800
Stipends for meeting translation services	144	$75	$10,800	$10,800
TOTAL OTHER			$118,800	$118,800
Total Project Cost				**$499,100**

B. Reasonableness of Costs

CARB staff will be responsible for planning and organizing meetings to understand community concerns and determine potential monitoring locations in collaboration with community partners. CARB staff will develop training materials, vetted by community partners, for operation and maintenance of instrumentation as well as storage and shipping of sample media to contract labs. CARB staff will provide culturally competent training to community members, community group staff, and local college students that will participate in the monitoring operations. CARB staff will be in charge of data management, review, analysis, and data reporting back to the community. All associated personnel costs above, and the associated fringe costs and travel costs, are not part of the EPA funding request and will be contributed by CARB to the project.

Monitoring will involve a combination of canister sampling and filter-based sampling at both locations. CARB will supplement the canister samplers to achieve sampling at three sites per community (only one is requested as part of the budget). Six PM filter samplers are requested such that two different filters can be collected at three sites simultaneously. A flow calibrator is requested for each site in anticipation that a different community member may operate and maintain each location. Multi-pollutant sensors that are solar-powered provide simpler logistics for deployment. We may not be able to rely on WiFi signals at some locations, and therefore WiFi access points will be purchased to leverage wider cellular network coverage and provide real-time transmission of data from the sensors.

We anticipate canister sampling to cover either 1-in-7 day sampling for a full year (chronic sampling methodology) or 4-in-7 day sampling for 13 weeks (sub-chronic sampling methodology), which equates to 52 samples per site in both cases. We intend to set up three sites per community, dependent on logistics and coverage. This monitoring strategy requires 312 canister samples in total over both communities. We plan on taking 1-in-3 day filter samples at 3 locations in both communities for XRF metal analysis and perform a further 1-in-3 day sampling for other pollutants (e.g., hexavalent chromium in the South Coast community and EC and OC measurements in La Viña). Monitoring for 72 days will generate 24 filters per sampler per community (144 per community). We use these sample numbers to estimate the cost of consumables, the cost of lab analysis, and the number of hours of operation and maintenance for the subaward to community groups that will be trained to perform the monitoring. The exact requirements of the sampling will be determined during the community meetings at both locations based on community concerns, siting logistics, and community capacity for monitoring operations.

Stipends will be provided to community members that participate in the project planning and operations training in accordance with practices for many AB 617 steering committee meetings. The communities are majority Spanish-speaking; therefore, we have also budgeted for translation services. The stipends are based on three 2-hour planning meetings per community with 20 community member attendees and three 3-hour training meetings per community with 12 attendees. Translation services are budgeted based on the number of hours of meetings (72) for two translators. Any further translation services for documentation and reports will be provided by CARB.

The budget is designed for flexibility, owing to the community-led focus of this project. The equipment requested should provide flexibility in terms of both the pollutants that can be measured and the sampling frequency to adequately represent the pollution burden based on the concerns raised and guidance provided by the community in the planning meetings. The monitoring will provide valuable data that can be used for future emission reduction activities. For example, the data can inform CARB rule-making (e.g., for metals), trigger actions if recommended exposure levels are exceeded (e.g., for pesticide monitoring), and bolster community requests for future AB 617 selection and community emission reduction plan (CERP) development.

C. Expenditure of Awarded Funds

CARB has extensive experience in community engagement, equipment and contract procurement, deployment of monitoring campaigns, and data analysis and reporting. CARB will leverage the administrative services division (ASD) within the agency to ensure that equipment is purchased efficiently and subawards and contracts are drafted with appropriate language and released for bid as soon as possible. Once we have met with community organizations to confirm the concerns and scope of actions, the specific equipment and contracts required to address those concerns will be submitted to ASD. We will develop detailed timelines for the instrument acceptance testing, training, deployment, and maintenance

to stay on target with the proposed timeline. CARB will have regular meetings and communications internally and with stakeholders. We will work closely with the community organizations to manage and distribute the stipends to the community members and process invoices for any subaward and contractors in a timely manner.

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[1] Community Air Protection Program. https://ww2.arb.ca.gov/capp
[2] Community Air Grants. https://ww2.arb.ca.gov/capp-cag
[3] Study of Neighborhood Air near Petroleum Sources. https://ww2.arb.ca.gov/our-work/programs/study-neighborhood-air-near-petroleum-sources/about
[4] AB 617 and Air Toxics Informational Update. https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2021/102821/21-11-3pres.pdf
[5] U.S. Census Bureau (2019). American Community Survey 5-year estimates. Retrieved from Census Reporter Profile page for La Viña, CA. http://censusreporter.org/profiles/16000US0640872-la-vina-ca/
[6] Leadership Counsel for Justice and Accountability (2020). Support for the San Joaquin Valley Air Pollution Control District's AB617 Nomination of La Viña.
https://community.valleyair.org/media/2060/leadership-council-for-justice-and-accountability-la-vina-no-2.pdf
[7] Based on the latest SIP inventory with a 2017 base year (CEPAM 2019SIP v1.01). Available at:
https://ww2.arb.ca.gov/applications/cepam2019v103-standard-emission-tool
[8] Shafter Community. https://ww2.arb.ca.gov/our-work/programs/community-air-protection-program/communities/shafter
[9] Eastern Coachella Valley Community.
https://ww2.arb.ca.gov/our-work/programs/community-air-protection-program/communities/eastern-coachella-valley
[10] CalEnviroScreen 4.0. https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40
[11] Percent limited English speaking households.
[12] Central Valley Asthma Collaborative: http://cencalasthma.org/
[13] Central California Environmental Justice Network. https://ccejn.org/.
[14] Allies in Reducing Emissions Collaborative: https://airecollaborative.org/
[15] Central Valley Air Quality Coalition: http://www.calcleanair.org/
[16] Leadership Counsel for Justice and Accountability. https://leadershipcounsel.org/.
[17] California Department of Pesticide Regulation Air Program: https://www.cdpr.ca.gov/docs/emon/airinit/airmenu.htm
[18] California Office of Enironmental Health Hazard Assessment: https://oehha.ca.gov/
[19] Coalition for Clean Air: https://www.ccair.org/
[20] East Yard Communities for Environmental Justice : http://eycej.org/
[21] Del Amo Action Committee: https://delamoactioncommittee.org/
[22] Community Air Protection Blueprint - Appendix E. Statewide Air Monitoring Plan. https://ww2.arb.ca.gov/sites/default/files/2020-03/final_community_air_protection_blueprint_october_2018_appendix_e_acc_0.pdf
[23] Community Air Quality Portal. https://ww2.arb.ca.gov/community-air-quality-portal
[24] Community Hub. https://ww2.arb.ca.gov/capp-communities
[25] Technology Clearinghouse. https://ww2.arb.ca.gov/our-work/programs/technology-clearinghouse/technology-clearinghouse-tools
[26] The CalEnviroScreen score is for the entire census tract, which spans about 144 sq-mi. La Viña, at about 0.1 sq-mi, accounts for less than 1% of this census tract.
[27] DTSC(2017) - More information on EnviroStor is available at: https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/04/EnviroStor_Factsheet_2017.pdf

Ex. 6 Personal Privacy (PP)

Robert K. Krieger

Ex. 6 Personal Privacy (PP)

Career Objective

- To apply my scientific training and work experience in providing appropriate instruction in the field of environmental science aimed at developing students to critically address the challenges and obtain the most relevant scientific research that can catapult them into a meaningful career.

Work Accomplishments

- Chief, Risk Reduction Branch within the Transportation and Toxics Division in the California Air Resources Board,
- Thirteen years management and leadership experience in dealing with complex technical and policy issues for state air toxic and climate change programs.
- Worked collaboratively with high-level management, representatives from 35 air pollution control officers from California Air Pollution Control Officers Association, and staff from the Office of Environmental Health Hazard Assessment (OEHHA) in the development and implementation of the Risk Assessment Guidelines and the creation of the Risk Management Guidance for Stationary Sources Air Toxics.
- Directed programs for the development of the emission reduction plans for the Waste Management Sector as used in AB 32 Scoping Plan 2014 and in contributing to the Short-Lived Climate Change Strategy. Within this capacity, worked with staff from CalRecycle to gain consensus on emission reduction projects related to recycling and waste reduction programs.
- Managed the development and/or implementation of Airborne Toxic Control Measures (ATCMs) for dry cleaning, ocean-going vessel incineration, asbestos surfacing and construction projects, composite wood products, and chrome plating.
- Identified toxic air contaminates under the state's air toxics program for: diesel exhaust particulate matter, environmental tobacco smoke, chloroform, formaldehyde, and the Federal Hazardous Air Pollutants under AB 2728.
- Supervised the development of the Hot Spots Analysis and Reporting Program for use by local air pollution control districts in their AB 2588, permitting, and new source review programs.
- Oversaw the planning and oversight of contracts for various air toxics-related research such as hexavalent chromium tank source testing, alternative fueled engine emissions, and non-toxic dry cleaning demonstration programs.
- Division program administrator for the California Air Resources Board's Transportation and Toxics Divisions website migration and document remediation for the implementation of AB 434 which requires that all State agency electronic and information technology websites be accessible to individuals with disabilities. To date, converted over 27 classic webpages to ADA accessible Drupal platform as well as remediated over 200 documents, publications, notices, and presentations.

Education Accomplishments

- Developed and designed online courses for High School students in consideration of California Common Core Standards.

- Created online educational training courses for CARB employees in ADA remediation and website migration efforts. Use online assessment tools to evaluate the effectiveness of this type of training.

Professional Experience

Air Resources Supervisor I – Air Resources Board, Transportation and Toxics Division, Risk Reduction Branch, Toxics Control Section ▪ Sacramento, California ▪ April 2007 – Present

- Supervise a group of professional engineers and scientists that perform complex air pollution control, engineering, and regulatory development and implementation work.
- Directed the implementation of AB 434 which requires the State agencies to make accessible their electronic and information technology websites for the Division. Coordinated work across several Branches within the Division on the rollout of the program, provided oversight, and assessed the effectiveness of the program. Lead a professional team of eight experienced engineers and scientists in this effort.
- Section responsibilities include the development and implementation of ATCMs under the California's air toxics law (AB 1807) including the determination of BACT and TBACT, integration of climate change regulations as established under California's Greenhouse Gas legislation (AB 32), and the coordination and implementation of the OEHHA's Risk Assessment Guidelines as required by the "Hot Spots" AB 2588 risk assessment and risk reduction regulation.
- The section was responsible for the development of the Hot Spots Analysis and Reporting Program (HARP). HARP is a software tool for implementing the OEHHA Guidelines which are used by local air pollution control districts in their AB 2588, permitting, and new source review programs.
- The scope of work for the section includes the development and implementation of ATCMs pertaining to dry cleaning operations, asbestos surfacing and construction activities, ocean going vessel incineration, chrome plating operations, as well as the evaluation and development of additional ATCMs such as metal melting and finishing operations.
- This section evaluates other measures such as the vessel speed reduction opportunities and administers the implementation of the California dry cleaning grant and demonstration program (AB 998).
- Under my leadership, the section was also responsible for the development of the Waste Sector component of the Scoping Plan and creating a waste sector plan and establishing public policies for reducing GHG emissions from present to 2020, 2030 and beyond.
- Additional section responsibilities include the drafting research contracts, working with industry to secure funding and tracking the contracts to their conclusion. The section provides technical assistance and guidance to districts, governmental agencies, public, and affected industries on air pollution control and risk management activities; reviews federal regulations and programs; helps develop toxics policies for the Board; and coordinates research activities.

Staff Air Pollution Specialist – Air Resources Board, Substance Evaluation Section, Sacramento, California ▪ March, 1999 – April, 2007

- Project lead for the development and implementation of the regulations for the identification of Environmental Tobacco Smoke as a TAC and the ATCM for formaldehyde from composite wood products.
- Under these regulatory programs, I had the responsibility of planning and organizing the projects, managing the work of the support staff to accomplish the requirements of the law, to work collaboratively with industry, local air pollution control districts, other governmental agencies, the scientific community including the State's Scientific Review Panel (SRP), and the public to adopt responsible and fair regulations based on sound scientific principles and practices.

Associate Air Pollution Specialist – Air Resources Board, Air Quality Measures Branch, Sacramento, California ▪ April, 1990 – March, 1999

- Project lead for the identification of diesel exhaust as a toxic air contaminant of formaldehyde, chloroform, and the 189 federal Clean Air Act hazardous air pollutants as toxic air contaminants

in California. In this capacity, I was responsible for writing the technical support document which supported the regulation as required by AB 1807. The work involved the coordination with OEHHA and the SRP to develop the technical report. The work also involved the development of a new emissions inventory approach and assessing several methods for estimating ambient concentrations of diesel exhaust. The process involved conducting several public workshops, administering a scientific symposium, several SRP meetings, and other stakeholder meetings to address a myriad of industry and public comments. Give technical and public presentations at workshops, meetings with industry, to the SRP, and to the Board.Ultimately, this was presented to the Board for identification in 1998.

- Project lead for the identification. Responsible for developing the technical support documents for each of the compounds listed above. Analyze and evaluate data and determining scientific rationale for identifying these compounds as TACs. Work cooperatively with the public to address issues related to the identification of these substances.

Teacher – Physical Education and Health Sciences – St Mel's Catholic School, Carmichael, California September 1986 – April, 1990.

- Develop and administer the physical education program for students ages K-8. Athletic Director for the school, coordinating the hiring of coaches, schedules and sports including girls softball, basketball, boys flag football and basketball.

Education

Colorado State University – Global Campus, Greenwood Village, Colorado
Master of Science in Organizational Leadership with specialization in Online Learning, 6/7/2020
GPA: 3.94 out of 4.0

California State University, Sacramento, California
Bachelor's Degree, 5/1992
Major: Environmental Studies
GPA: 3.5 out of 4.0

Colorado State University, Fort Collins, Colorado
Bachelor's Degree, 6/1985
Major: Physical Education
GPA: 3.5 out of 4.0

CHANDAN MISRA

AIR RESOURCES SUPERVISOR I

P Ex. 6 Personal Privacy (PP) E Ex. 6 Personal Privacy (PP) A Ex. 6 Personal Privacy (PP) W Ex. 6 Personal Privacy (PP)

SUMMARY

Over twelve years at California Air Resources Board with first line managerial experience. Experienced in project management, community programs, emissions characterization, air monitoring and incentives programs.

EXPERIENCE

Dec 2017 – Current
Air Resources Supervisor I -- California Air Resources Board
Direct first line manager developing technical, policy and equity products for AB 617 communities. Cross-divisional projects, inter-agency coordination in a high energy high visibility program.

Aug 2016 – Nov 2017
Staff Air Pollution Specialist -- California Air Resources Board
Lead on updating EMFAC2017 heavy-duty module. Regulatory support on heavy-duty regulations.

Mar 2011 – Jul 2016
Air Resources Engineer -- California Air Resources Board
In-use heavy-duty emissions characterization. Contracted research to gauge heavy-duty aftertreatment deterioration. PM toxicity for light duty vehicles.

Dec 2008 – Feb 2011
Air Resources Engineer -- California Air Resources Board
Administering Prop1B incentive funds. Prop1B liaison for Bay Area. Developing emissions benefit calculators. Database design for collecting Prop1B applications.

Jul 2007 – Nov 2008
Product Marketing Specialist -- TSI Inc.
Market research for new product development. Marketing campaigns and literature generation.

Jul 2005 – Aug 2006
Associate Research Scientist -- Lovelace Respiratory Research Institute
Inhalation toxicology. Pharmaceutical aerosol characterization. Engine emissions testing.

Sep 2003 – Feb 2005
Aerosol Scientist -- Salter Labs
Pharmaceutical aerosol characterization. Development of nebulizers and inhalers.

EDUCATION

MBA (2008)
University of St. Thomas
Minneapolis, MN

PhD (2003) Env. Engg.
University of Southern California
Los Angeles, CA

MS (2000) Env. Sc. and Engg.
Indian Institute of Technology
Mumbai, MH India

BS (1995) Chemistry
University of Delhi
Delhi, DL India

KEY SKILLS

- COMMUNITY PROGRAMS
- AIR MONITORING
- ENGINE EMISSIONS CHARACATERIZATION
- WRITING SKILLS
- CROSS AGENCY PROJECTS
- PROJECT MANAGEMENT
- TECHNICAL TOOLS

PUBLICATIONS

- OVERLEAF

CONFERENCE PRESENTATIONS

- AVAILABLE UPON REQUEST

SELECTED PUBLICATIONS

Zavala, M., Huertas, J.I., Prato, D., Jazcilevich, A., Aguilar, A., Balam, M., **Misra, C.**, Molina, L.T., 2017. Real-world emissions of in-use off-road vehicles in Mexico. Journal of the Air & Waste Management Association 67, 958–972. https://doi.org/10.1080/10962247.2017.1310677

Misra, C., Ruehl, C., Collins, J., Chernich, D., Herner, J., 2017. In-Use NOx Emissions from Diesel and Liquefied Natural Gas Refuse Trucks Equipped with SCR and TWC, Respectively. Environ. Sci. Technol. 51, 6981–6989. https://doi.org/10.1021/acs.est.6b03218

Yoon, S., Collins, J.F., **Misra, C.**, Herner, J.D., Carter, M.W., Sax, T.P., 2017. In-Use Emissions from 2010-Technology Heavy-Duty Trucks: Impact on Air Quality Planning in California. Transportation Research Record 2627, 1–8. https://doi.org/10.3141/2627-01

Bishop, G.A., Hottor-Raguindin, R., Stedman, D.H., McClintock, P., Theobald, E., Johnson, J.D., Lee, D.-W., Zietsman, J., **Misra, C.**, 2015. On-road Heavy-duty Vehicle Emissions Monitoring System. Environ. Sci. Technol. 49, 1639–1645. https://doi.org/10.1021/es505534e

Ruehl, C., Herner, J.D., Yoon, S., Collins, J.F., **Misra, C.**, Na, K., Robertson, W.H., Biswas, S., Chang, M.-C.O., Ayala, A., 2015. Similarities and Differences Between "Traditional" and "Clean" Diesel PM. Emiss. Control Sci. Technol. 1, 17–23. https://doi.org/10.1007/s40825-014-0002-7

Misra, C., Collins, J.F., Herner, J.D., Sax, T., Krishnamurthy, M., Sobieralski, W., Burntizki, M., Chernich, D., 2013. In-Use NOx Emissions from Model Year 2010 and 2011 Heavy-Duty Diesel Engines Equipped with Aftertreatment Devices. Environ. Sci. Technol. 47, 7892–7898. https://doi.org/10.1021/es4006288

Campbell, A., Oldham, M., Becaria, A., Bondy, S., Meacher, D., **Misra, C.**, Méndez, L., Kleinman, M., 2005. Particulate Matter in Polluted Air May Increase Biomarkers of Inflammation in Mouse Brain. Neurotoxicology 26, 133–40. https://doi.org/10.1016/j.neuro.2004.08.003

Zhao, Y., Bein, K.J., Wexler, A.S., **Misra, C.**, Fine, P.M., Sioutas, C., 2005. Field evaluation of the versatile aerosol concentration enrichment system (VACES) particle concentrator coupled to the rapid single-particle mass spectrometer (RSMS-3). Journal of Geophysical Research: Atmospheres 110. https://doi.org/10.1029/2004JD004644

Khlystov, A., Zhang, Q., Jimenez, J.L., Stanier, C., Pandis, S.N., Canagaratna, M.R., Fine, P., **Misra, C.**, Sioutas, C., 2005. In situ concentration of semi-volatile aerosol using water-condensation technology. Journal of Aerosol Science 36, 866–880. https://doi.org/10.1016/j.jaerosci.2004.11.005

Misra, C., Fine, P., Singh, M., Sioutas, C. 2004. Development and Evaluation of A Compact Facility for Exposing Humans to Concentrated Ambient Ultrafine Particles. Aerosol Science and Technology January 2004, 27–35. https://doi.org/10.1080/02786820490247605

Li, N., Sioutas, C., Cho, A., Schmitz, D., **Misra, C.**, Sempf, J., Wang, M., Oberley, T., Froines, J., Nel, A., 2003. Ultrafine particulate pollutants induce oxidative stress and mitochondrial damage. Environ Health Perspect 111, 455–460. https://doi.org/10.1289/ehp.6000

Misra, C., Geller, M.D., Sioutas, C., Solomon, P.A., 2003. Development and Evaluation of a PM 10 Impactor-Inlet for a Continuous Coarse Particle Monitor. Aerosol Science and Technology 37, 271–281. https://doi.org/10.1080/02786820300949

Singh, M., **Misra, C.**, Sioutas, C., 2003. Field evaluation of a personal cascade impactor sampler (PCIS). Atmospheric Environment 37, 4781–4793. https://doi.org/10.1016/j.atmosenv.2003.08.013

Misra, C., Singh, M., Shen, S., Sioutas, C., Hall, P.M., 2002. Development and evaluation of a personal cascade impactor sampler (PCIS). Journal of Aerosol Science 33, 1027–1047. https://doi.org/10.1016/S0021-8502(02)00055-1

Geller, M.D., Kim, S., **Misra, C.**, Sioutas, C., Olson, B.A., Marple, V.A., 2002. A Methodology for Measuring Size-Dependent Chemical Composition of Ultrafine Particles. Aerosol Science and Technology 36, 748–762. https://doi.org/10.1080/02786820290038447

Misra, C., Kim, S., Shen, S., Sioutas, C., 2002. A high flow rate, very low pressure drop impactor for inertial separation of ultrafine from accumulation mode particles. Journal of Aerosol Science 33, 735–752. https://doi.org/10.1016/S0021-8502(01)00210-5

David A. Ridley

Contact

Ex. 6 Personal Privacy (PP)

Education

Ph.D., Atmospheric Science (2009)
Institute of Climate and Atmospheric Science, University of Leeds, Leeds, UK
Developed and assessed a state-of-the-art global microphysical model of aerosol processes using remote sensing observations and in-situ optical measurements from NASA platforms.

M.Phys. (incl. B.Sc.), Physics with Space Science & Technology *First Class with Honours* (2004)
Dept. of Physics and Astronomy, University of Leicester, Leicester, UK

Experience

Monitoring & Laboratory Division, Air Resources Board, Sacramento, CA, USA (Jun 2018 – Present)
Air Pollution Specialist
Designing, leading, and reviewing monitoring projects. Evaluating advanced monitoring technology for air quality purposes. Developing data management systems and visualizations for stationary, network, mobile, and satellite air monitoring data. Performing longitudinal analysis of Agency monitoring data. Liaison to air districts in implementation of AB617 community air monitoring.

Massachusetts Institute of Technology (MIT), Cambridge, MA, USA (Oct 2014 – Jun 2018)
Research Scientist
Developing a global dust aerosol metric from satellite retrievals, quantifying the impact of aerosol size distribution representation in CTMs on the aerosol direct radiative impact, quantifying statistical uncertainty for the aerosol direct radiative effect, assessing the role of organic aerosol in air quality and premature mortality in the US.

Massachusetts Institute of Technology (MIT), Cambridge, MA, USA (Oct 2012 - Oct 2014)
Post-Doctoral Research Associate
Leading several projects including aerosol trend attribution, developing sub-grid parameterizations for chemical transport models (CTM) and integrating a radiative transfer code into a CTM, involving regular use of remote sensing products.

Self-employed, Leeds, UK (Sept 2011 – Oct 2012)
Research Consultant
Research under contract for Massachusetts Institute of Technology and Colorado State University

Atmospheric Science Department, Colorado State University, CO, USA (Sept 2009 – Sept 2011)
Post-Doctoral Research Associate
Improved and evaluated a global chemical transport model simulations of dust storms and their impacts on the biosphere. Evaluated model dust deposition through satellite observations.

Institute of Climate and Atmospheric Science, University of Leeds, UK (July 2008 – Sept 2009)
Post-Doctoral Research Associate
Employed a Monte-Carlo methodology to determine the uncertainty in modelled ozone pollution resulting from reaction rate kinetics. Created a compact chemistry model GUI for students to explore important chemical mechanisms in the atmosphere relating to air quality.

Selected Publications

1. **D. A. Ridley**, C. L. Heald, K. J. Ridley, J. H. Kroll, "Causes and consequences of decreasing atmospheric organic aerosol in the U.S.", *Proceedings of the National Academy of Sciences 115 (2), 290-295* (2017)
2. **D. A. Ridley**, S. R. Arnold, J. Methven, M. Cain, "Sensitivity of tropospheric ozone to chemical kinetic uncertainties in air masses influenced by anthropogenic and biomass burning emissions", *Geophys. Res. Lett., 44, 7472–7481, doi:10.1002/2017GL073802* (2017)
3. J. F. Kok, **D. A. Ridley**, Q. Zhou, C. Zhao, R. L. Miller, C. L. Heald, K. Haustein, Smaller desert dust cooling effect estimated from analysis of dust size and abundance, *Nat. Geosci., 10, 274–278, doi:10.1038/ngeo2912* (2017)
4. **D. A. Ridley**, C. L. Heald, J. F. Kok, C. Zhao, "An observationally-constrained estimate of global dust aerosol optical depth", *Atmos. Chem. Phys., 16(23), 15097–15117, doi:10.5194/acp-16-15097-2016* (2016)
5. R. H. Williams, D. McGee, C. W. Kinsley, **D. A. Ridley** et al., "Glacial to Holocene changes in trans-Atlantic Saharan dust transport and dust-climate feedbacks", *Science Advances, 2(11), e1600445, doi:10.1126/sciadv.1600445* (2016)
6. B. D. Santer, R. R. Neely III, G. A. Meehl, J-F. Lamarque, S. Solomon, **D. A. Ridley**, C. Bonfils, J. Painter, and M. D. Zelinka, "Climate impact of volcanic forcing uncertainty", *Nature Climate Change, 6, 3–4, doi:10.1038/nclimate2859* (2016)
9. **D. A. Ridley**, S. Solomon, J. E. Barnes, V.D. Burlakov, T. Deshler, S.I. Dolgii, A.B. Herber et al. "Total volcanic stratospheric aerosol optical depths and implications for global climate change", *Geophys Res. Lett., 41, 7763–7769, doi:10.1002/2014GL061541* [cover story] (2015)
10. **D. A. Ridley**, C. L. Heald, J. M. Prospero, "What controls the recent changes in African mineral dust aerosol across the Atlantic?", Atmos. Chem. Phys., 14, 5735-5747, doi:10.5194/acp-14-5735-2014 (2015)

Presentations and Workshops

Conference Planning Committee, Air Sensors International Conference (2019, 2021), **Presenter** at American Geophysical Union Fall Meeting, San Francisco, CA, USA (2014, 2015, 2016, 2017, 2018, 2019, 2020), **Invited speaker**, Atmospheric & Environmental Chemistry Seminar Series, Environmental Science and Engineering Dept., Harvard University, MA, USA (2017), **Speaker** at the 8th International GEOS-Chem Meeting, Harvard University, MA, USA (2017), **Invited colloquium speaker**, Planet Labs, San Francisco, CA, USA (2015), **Invited seminar**, Dept. of Meteorology, University of Reading, Reading, UK (2015), **Invited seminar**, Dept. of Chemistry, University of York, York, UK

Grants, Reviewing and Teaching

Reviewer for Nature, Science, PNAS, Journal of Geophysical Research, Atmospheric Chemistry and Physics, Environmental Research Letters, Atmospheric Environment
Reviewer for NASA ROSES grant proposals, AGU Chapman Conference proposals

Grant Award (with PI Prof. Colette Heald) of funded NASA ROSES grant proposal ($447,000, 2014)

Teaching certification course award – Massachusetts Institute of Technology, Cambridge, MA
Course development, Air Pollution CE-149 data analysis lab (Python) - College of Engineering, UC Davis, Davis, CA
Lecturer, 1.085 Air Pollution, "Radiation & Greenhouse Effect" - MIT, Cambridge, MA
Teaching Assistant, SOEE2480 Atmospheric Pollution and Environmental Change - *Institute of Climate and Atmospheric Science, University of Leeds, UK*
ENV2001 Statistics, teaching assistant - *Institute of Climate and Atmospheric Science, University of Leeds, UK*
ENV1001 Renewable energy, teaching assistant - *Institute of Climate and Atmospheric Science, University of Leeds, UK*
Outreach Presentations - Presentations at high schools in the UK, Massachusetts, and United Arab Emirates, ranging from very low to very high socioeconomic status, on careers in both science and music to inform and inspire the next generation.

Technical Skills

Primary languages: Python (5 years), SQL (5 years), Fortran (10 years), Interactive Data Language (IDL, 14 years)
Secondary languages: Visual Basic (4 years), HTML (4 years), C++ (1 year)
Other packages: Excel (with VBA), PowerPoint, Drupal, Dreamweaver, Fireworks

YANJU CHEN

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ACCOMPLISHMENTS

- Detailed knowledge on local and regional air quality and source emissions
- Extensive experiences with statistical data analysis, computational modeling and air sampling measurements
- Ability to lead projects, handle multiple tasks and meet deadlines, self-motivated and self-directed
- Excellent communication, collaboration and coordination skills

EDUCATION

Ph.D.	Environmental Engineering	University of Illinois at Urbana-Champaign, Illinois	*2011*
M.S.	Environmental Science and Engineering	Tsinghua University, Beijing, China	*2006*
B.S.	Environmental Engineering	Tsinghua University, Beijing, China	*2003*

PROFESSIONAL EXPERIENCE

Air Resources Supervisor I

California Air Resources Board, Sacramento, California *Sep. 2021 – Present*

Leading and managing the Community Air Quality Section

- Development of CARB's centralized air quality data portal AQview
- Communicating with community air quality monitoring data providers
- Conducting community-level air quality data analysis

Staff Air Pollution Specialist

California Air Resources Board, Sacramento, California *Jan. 2018 – Aug. 2021*

- Characterize community air quality with mobile measurement technology
- Overview CARB's Methane Research Program to guide CARB's future research directions
- Characterize methane emission from California landfills via extensive analysis of multiple datasets

Air Resources Engineer / Air Pollution Specialist

California Air Resources Board, Sacramento, California *Mar. 2015 – Dec. 2017*

- Ambient GHG concentration monitoring
- Aliso Canyon natural gas leak incident response
- Rule benefit analysis of CARB's Diesel Risk Reduction plan
- Estimate exposure impact of major point sources in California

Postdoctoral Research Associate

University of Illinois at Urbana-Champaign, Illinois *Nov. 2011 – Feb. 2015*

- Simulate ambient concentration and climate impact of carbonaceous aerosols with global climate models.
- Analyze large-scale datasets and estimate mitigation potential from regional sources.
- Provide scientific recommendations to policy makers on carbonaceous aerosols reduction strategies.

Graduate Research Assistant

University of Illinois at Urbana-Champaign, Illinois *Aug. 2006 – Nov. 2011*

- Develop laboratory methods to generate, sample and analyze particles from combustion.
- Characterize optical and chemical properties of particles with a variety of instruments and techniques.
- Design and prepare necessary facilities for real-world cookstove tests in Africa and Asia.
- Analyze large real-time datasets from real-world cookstove emission measurements.

TECHNICAL SKILLS

- **DATA ANALYSIS**: large dataset processing, statistical analysis and visualization with Microsoft Excel, Python and MATLAB; spatial data analysis and interpretation with ArcGIS and Google Earth.
- **MODELING**: emission/dispersion model (AERMOD), back trajectory model (HYSPLIT), climate model (CESM).
- **EXPERIMENTAL**: ambient air quality sampling (system build-up, instruments calibration and data acquisition), physical and chemical analysis of atmospheric gases and particles.
- **CERTIFICATION:** Professional Engineer in Chemical Engineering, California, 2017.

CARB Awards

- 2015 Gold Superior Accomplishment Awards - Aliso Canyon Natural Gas Leak Team
- 2019 Gold Superior Accomplishment Awards - Community Monitoring Framework Development

SELECTED PUBLICATIONS AND PRESENTATIONS

- **Chen, Y.**, Gu, P., Schulte, N., et al.: A new mobile monitoring approach to characterize community-scale air pollution patterns and identify local high pollution zones, *Atmospheric Environment*, 272, 2022.
- Kuwayama, T., Charrier, J. G., **Chen, Y.**, et al.: Source apportionment of ambient methane enhancements in Los Angeles, California, to evaluate emission inventory estimates, *Environmental Science & Technology*, 53 (6), 2961 – 2970, 2019
- **Chen, Y.**, Wang, H., Singh, B., et al.: Investigating the linear dependence of direct and indirect radiative forcing on emission of carbonaceous aerosols in a global climate model, *Journal of Geophysical Research, 123 (3), 1657 – 1672, 2018*
- Li, X., **Chen, Y.**, and Bond, T. C.: Light absorption of organic aerosol from pyrolysis of corn stalk, *Atmospheric Environment*, 144, 249 – 256, 2016.
- **Chen, Y.**, Roden, C. A., Bond, T. C.: Characterizing biofuel combustion with patterns of real-time emission data (PaRTED), *Environmental Science & Technology*, 46 (11), 6110-6117, 2012.
- Lam, N., **Chen, Y.**, Weyant, C., et al.: Household light makes global heat: high black carbon emissions from kerosene wick lamps, *Environmental Science & Technology*, 46 (24), 13531–13538, 2012.
- **Chen, Y.,** Bond, T. C.: Light absorption by organic carbon from wood combustion, *Atmospheric Chemistry and Physics,* 10, 1773-1787, 2010.
- **Chen, Y.,**: Linearity between direct and cloud-related forcing of regional carbonaceous aerosols and their emissions, ***invited presentation*** *at Atmospheric Sciences & Global Change Division, Pacific Northwest National Laboratory*, Richland, WA, 2014.
- **Chen, Y.**: Emission measurement from in-use cookstoves in four locations, ***invited presentation*** *at the 5th Biennial Partnership for Clean Indoor Air Forum, Lima, Peru*, 2011.

Jennifer Magaña

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CAREER OBJECTIVE

To further my career with The California Air Resources Board (CARB) and be able to effectively use all of the skills I've developed throughout my work experience and education. I'd like to apply my acquired skillset in order to assist with CARBs implementation efforts to protect public health.

PROFESSIONAL EXPERIENCE

AIR RESOURCES BOARD: OFFICE OF COMMUNITY AIR PROTECTION, Sacramento, CA

Air Pollution Specialist, November 2019 – Present

- Bilingual interpreter/translator for phone calls, distributed materials, webpage
- Community liaison for South Sacramento/Florin and South-Central Fresno
- Assist with the allocation and disbursement of AB 617 Implementation Grants
- Work with Air Districts and Community members on the implementation of AB 617
- Collaborate with other Divisions and Sections to provide comprehensible information on different programs to community members
- Attend monthly Community Steering Committee Meetings and Subcommittee meetings
- Provide support to Air District staff on CARB topics or as needed

AIR RESOURCES BOARD: ENFORCEMENT DIVISION, Sacramento, CA

Air Pollution Specialist, May 2017 - Present

- Lead APS for the Citations and Hotline Section (CHS)
- Well-versed in all Diesel ATCM and HDVIP regulations and requirements
- Provided oversight, scheduling and training for all incoming staff utilizing various training methods and media
- Researched and analyzed incoming citations data for Branch and Division Chief
- Completed queries on citations data to further improve process workflow and maximize efficiency
- Certified Spanish translator for calls and correspondence
- Created charts, graphs and presentations for stakeholders and Enforcement staff for an understanding of the correlation between compliance and reducing toxic air contaminants as well as criteria pollutants
- Organized data using Microsoft Office programs
- Provided compliance assistance and outreach to stakeholders (English & Spanish)
- Liaison between, local air districts, CHS and legal department to provide further enforcement actions on delinquent citations
- Investigated companies with multiple citations for fleet audit purposes
- Worked with other APS on the Cargo Tank Vapor Recovery Fee Amendment Project as a result of AB 617
- Performed fleet reviews and verified compliance documents for the enforcement of Senate Bill 1
- Worked with other enforcement branches and local air districts in order to provide consistency on diesel enforcement
- Trained in the US EPA Economic Financial Hardship Models – For Financial Hardship requests and penalty reductions
- Generated weekly reports of citations data using SQL Server Reporting Services and lead for submitting Change Request forms for improving the Citations DMS
- Assisted upper management with Budget Change Proposals and Position Classifications & Justifications to meet the needs of the section
- Well versed in utilizing various databases for research purposes
- Worked with management in other sections to create minimum criteria for the issuance of citations
- Established a Deficiency and Minor Violation concept in order to improve compliance with ATCM and HDVIP aiding in emission reductions
- Maintained sections supplies in stock

DEPARTMENT OF HEALTH CARE SERVICES, Sacramento, CA

Staff Service Analyst, Sept 2016 – May 2017

- Analyze incoming data and correspondence
- Establish and setup cases for staff
- Appropriate use of DOS, Interwoven, SharePoint
- Request medical reports from various health care providers
- Certified Spanish translator for calls and correspondence
- Respond to Subpoenas in a timely manner
- Organize data using excel and word processing
- Manage accounting screens in DOS and made sure the case penalty balances out per the Settlement Agreement

AIR RESOURCES BOARD: ENFORCEMENT DIVISION, Sacramento, CA

Air Technician II, Jan 2012 –Sep 2016

- Lead Air Technician II
- Lead for all Spanish inquiries
- Lead for 7 different citation programs
- Translate documents, messages, invoices from Spanish to English
- Read and analyze incoming emails, submissions, and invoices to determine their significance, distribute if necessary
- Conduct research and compile data for citation processing as well as citation clearing
- Prepare letters, charts, and other documents, using Microsoft Office.
- Order and distribute supplies
- Monitor citation deadlines and financial accounts, prepare delinquency letters
- Retrieve phone messages and emails and route them accordingly
- Experience using state databases such as DMV, ECTS, CHP MISTER/BIT, ARBERQ, TRUCRS, CITS,
- Dispose of, or oversee the disposal of, confidential files and documents

AIR RESOURCES BOARD: MOBILE SOURCE CONTROL DIVISION, Sacramento, CA

Student Assistant & Air Technician II, Mar 2009 – Dec 2011

- Lead Student
- Lead for all Spanish Inquiries
- Trained newly hired students
- Prepared and maintain records of callers
- Prepared and maintained outlines for emails and phone calls
- Conducted research on trucking companies for staff to use with investigations, fleet audits, and regulation amendments
- Prepared presentations and factsheets for cross-training staff and students on different regulations
- Assisted callers with regulatory information at their request
- Assisted staff at conferences and public trainings
- Retrieved phone messages and emails and routed them accordingly
- Developed formal procedures for the 866-DIESEL Hotline.
- Created and maintained scheduling chart for staff

EDUCATION

CALIFORNIA STATE UNIVERSITY OF EAST BAY, Hayward, CA

Bachelor of Science in Business, September 2015

- Concentrations in, Marketing, Public Relations & Advertising, Operations Management

CALIFORNIA STATE UNIVERSITY OF SACRAMENTO, Sacramento, CA

General Education, Pre-Business, September 2007

- Completed GE courses and Pre- Business

ADDITIONAL SKILLS

- Proficient in Microsoft Office and Adobe Illustrator CS5, SPSS, Alteryx, ArcGis, Visio
- Bilingual- Spanish (certified) and English
- Excellent interpersonal, oral, and written communication skills